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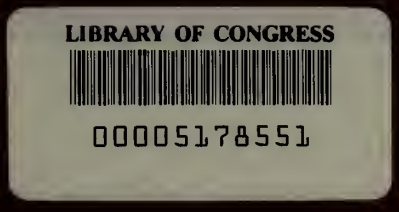

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Characterization of the 1986 Nonmetallic Mining Workforce

By Shail J. Butani and Ann M. Bartholomew

UNITED STATES DEPARTMENT OF THE INTERIOR

Information Circular 9204

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UNITED STATES DEPARTMENT OF THE INTERIOR
Donald Paul Hodel, Secretary

BUREAU OF MINES
T S Ary, Director

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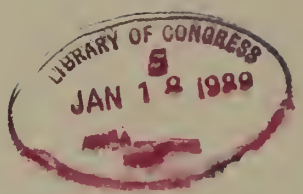

Library of Congress Cataloging in Publication Data:

Butani, Shail J.
Characterization of the 1986 nonmetallic mining workforce.

(Information Circular / Bureau of Mines; 9204)

Bibliography: p. 7.

Supt. of Docs. no.: I 28.27:9204.

1. Miners—United States. I. Bartholomew, Ann M. II. Title. III. Title: Nonmetallic mining workforce. IV. Series: Information circular (United States. Bureau of Mines); 9204.

TN295.U4 [HD8039.M62U617] 622 s [331.7'622'0973] 88-600261

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UNIT OF MEASURE ABBREVIATIONS USED IN THIS REPORT

h	hour	pct	percent
yr	year		

CHARACTERIZATION OF THE 1986 NONMETALLIC MINING WORKFORCE

By Shail J. Butani[1] and Ann M. Bartholomew[2]

ABSTRACT

In 1986 the Bureau of Mines conducted a probability sample survey, Mining Industry Population Survey, to measure such employee characteristics as occupation; principal equipment operated; work location at the mine; present job, present company, and total mining experience; job-related training during the last 2 years; age; sex; race; and education. The population estimates are necessary to properly analyze the Mine Safety and Health Administration (MSHA) injury (includes illness and fatality data) statistics; that is, to compare and contrast injury rates for various subpopulations in order to identify those groups that are exhibiting higher than average injury rates.

This report uses the survey's results to characterize the U.S. nonmetallic mining workforce from March through September 1986. Similar reports have been prepared for the metallic, stone, and sand and gravel mining industries, as well as for the entire metal and nonmetal mining (includes metallic, stone, sand and gravel, and nonmetallic industries) sector and the coal mining sector.

[1]Mathematical statistician (now with Bureau of Labor Statistics, Washington, DC).
[2]Statistical assistant.
Twin Cities Research Center, Bureau of Mines, Minneapolis, MN.

INTRODUCTION

According to the occupational safety and health (OSH) statistics published annually by the U.S. Department of Labor, Bureau of Labor Statistics, the mining industry (excluding oil and gas extraction) always has had one of the highest injury incidence rates among the major industry divisions. One of the primary objectives of the Bureau of Mines is to conduct research in the area of health and safety of the nation's miners, aimed at reducing the incidence rate of work-related injuries (includes illnesses and fatalities) in the domestic mining industry. In order to reduce the overall incidence rate, the Bureau needs to identify which groups or subpopulations of the workforce are exhibiting higher than average incidence rates.

To identify the high-risk groups, information about the injured workers and about the entire workforce is required. Present regulations permit MSHA to collect information on all mine injuries requiring medical attention. Hence, a data base containing various characteristics on the *injured* workforce is available. Since similar information about the *entire* workforce was not available, the Bureau conducted a probability sample survey called the Mining Industry Population Survey (MIPS), also known as the demographics survey, to collect the necessary data. The 1986 survey measured the following characteristics: job title or occupation, principal equipment operated, work location at mine, experience at present job, experience at present company, total mining experience, job-related training during the last 2 years, age, sex, race, and education. This demographics survey provided information about the population at risk and will aid research in pinpointing the hazardous segments of the population, as illustrated by the following example.

From MSHA's injury data base, it is known that 1,215 males and 49 females working in the U.S. nonmetallic mining industry were injured in 1986. If information about the population at risk (i.e., the number of male and female workers for the nonmetallic mining industry in 1986) is not known, then it is not valid to draw the conclusion that male miners are at a much higher injury risk than female miners. The estimates from the demographics survey show that there were a total of 30,966 male workers and 2,311 female workers (table E-15) employed in U.S. nonmetallic mining in 1986. Of these workers, the nonoffice workforce identified by occupation or job title consists of 29,873 males and 1,061 females (table E-7). The reason for excluding office workers from the analysis is to account for some of the obvious differences in job risk. It should be noted that in the office worker category only 4 pct are males and 54 pct are females (table E-15). The added information on the population puts the injury statistics in a better perspective, as shown in table 1.

Table 1.—Population and injury statistics for 1986 nonmetallic mining sector

	Population statistics		Injury statistics			
	Workers	pct	Injuries	pct	Lost workdays	pct
Male	29,873	96.6	1,215	96.1	16,919	95.1
Female ..	1,061	3.4	49	3.9	881	4.9
Total...	30,934	100.0	1,264	100.0	17,800	100.0

Since the difference between the distribution of workers and lost workdays is relatively large, it would be interesting to further investigate the source of variation. Could the source of variation be job mix by sex?

Hence, the present research will aid in finding solutions to reduce the injury incidence rates for the high-risk groups. That is, the collected information will be used to compare and contrast the demographics composition of the hazardous groups with those of the safer groups. Thus, through present research, the differences and similarities between the two groups can be defined.

The purpose of this report is to provide the U.S. nonmetallic mining population estimates for March through September 1986 by various characteristics. This information is essential to performing the injury data analysis that is the ultimate goal of the survey.

In addition to this report, there are three companion reports (*1-3*)[3] covering the metallic, stone, and sand and gravel mining industries. Summary reports have been published for the entire metal and nonmetal mining industry (*4*) and the coal mining industry (*5*).

ACKNOWLEDGMENTS

The authors thank the officials of the U.S. Department of Labor, MSHA, for submitting the MIPS justification package to the Office of Management and Budget for its clearance to collect the data. Special thanks go to Kathy Snyder, public affairs specialist, Office of Information and Public Affairs, MSHA, for initiating the study, and to Edwin Thomasson, research liaison officer, Technical Support, MSHA, for his continuous effort and support.

SURVEY METHODOLOGY

POPULATION

The MIPS covered all workers employed in the anthracite coal (SIC[4] 111), bituminous coal (SIC 121), metal (SIC 101-106, 109, 281), stone (SIC 141, 142, 324, 327), sand and gravel (SIC 144), and nonmetal (SIC 131, 145, 147, 149, 289, 299) mining industries of the United States during the period March through September 1986. This report gives estimates only for the nonmetallic mining sector.

The information pertaining to the mine employees included in the survey was collected through the mine operators, because a comprehensive sampling frame (name and address file) of the workers in mine establishments was not available, and cost considerations prohibited the data collection through personal visits. The number of universe units (establishments under MSHA's jurisdiction) covered by the scope of this survey was approximately 18,350, with a total employment level of about 350,000. The number of establishments and employment for the nonmetallic mining was about 1,050 and 34,000, respectively. The scope of the data for

[3]Italic numbers in parentheses refer to items in the list of references preceding the appendixes at the end of this report.

[4]The Standard Industrial Classification (SIC) was revised in 1987; the industry group numbers used here are those in effect at the time of the MIPS.

the employees covered by this survey is the same as that of the data collected by MSHA form 7000-1 for mine accidents, injuries, illnesses, and fatalities, and MSHA form 7000-2 for quarterly mine employment. The collection of the fundamental statistics reported on these two forms is required by law (30 U.S.C. 813; 30 CFR 50).

SAMPLE

The principal feature of the survey sample design was its use of two-stage stratified random sampling. The primary sampling units (first stage) were the mine establishments; the secondary sampling units were employees within each of the chosen mine establishments. The characteristics used to stratify the primary units were the industry (anthracite coal, bituminous coal, metal, stone, sand and gravel, nonmetal); mine type (underground, surface, plant or mill); employment size class (1-19, 20-49, 50-99, 100-249, 250-499, 500-999, 1,000 and above); and status code (active, intermittent). Since the first three stratification characteristics are highly correlated with the characteristics that the survey was to measure, use of stratified sampling increased the efficiency of the sample design and thus resulted in a smaller required sample size. The fourth characteristic, status code, was chosen so that nonresponse adjustment could be made within more homogenous groups. This is desirable because proportionately higher numbers of nonmailable, out-of-business, refusal, etc., responses are reported from intermittent mine establishments than from active mine establishments.

The sampling frame used for this survey was the 1985 preliminary address and employment file maintained by MSHA. A probability sample of 297 nonmetallic mining establishments from a universe of 1,043 nonmetallic mining establishments was selected by stratifying the frame as previously described and using a systematic sampling procedure with a random start for each stratum. The employees within an establishment were selected by using a systematic sampling procedure with a common random start for each employment size class.

A brief description of the sample allocation is as follows. For larger employment size classes, the allocation procedure placed all of the establishments on the frame in the sample as primary sampling units from which the employees were subsampled at a low frequency rate. As employment size class decreased, smaller and smaller proportions of the establishments were included as primary sampling units, but the employees within the establishments were subsampled at a higher frequency rate. The use of this procedure gave each employee, to the extent possible, about the same probability of inclusion in the sample, thus reducing the sampling variability. In order to limit the response burden for any one establishment, a maximum sample of 50 employees per establishment was selected.

DATA COLLECTION

The MIPS was conducted from March through September 1986 by mail questionnaire through the Bureau's Twin Cities (MN) Research Center. A reproduction of the original letter, followup letter, and the questionnaire bearing the Office of Management and Budget clearance number authorizing collection of the data are included in appendix F.

The response status for the nonmetallic mining sector from the original and followup mailings, as well as from telephone calls to the nonrespondents, is summarized here. From a total population of 1,043 nonmetallic mining establishments, the survey sampled 297 operations. The *overall response* and *rate* were 282 and 95 pct, respectively. There were 41 out-of-scope returns (i.e., out of businesses, nonmailables, duplicates, temporary inactives, and new businesses under construction); the remaining 256 returns were within the scope of the survey (i.e., nonrespondents, usables, refusals, and unusables). Of the 256 in-scope records, 219 were usables. Thus, the survey achieved a *usable response rate* of 86 pct.

A brief description of the response terms follows:

Response code	*Description*
Nonrespondent	Received no response from the establishment.
Usable	Establishment provided usable data.
Refusal	Establishment refused to provide any data.
Unusable	Establishment provided data that were not in usable format.
Nonmailable	Establishment's address was either insufficient or wrong.
Duplicate	Data were combined with another establishment's data.
Out-of-business	Establishment was permanently closed.
New business	Establishment was in development stage.
Temporary inactive	Establishment was temporarily not operating.

As part of the data collection phase, all the returns were reviewed and edited for completeness and reasonableness of the data. Whenever there were inconsistencies, the respondents were called for reconciliation. Also, almost all of the respondents that had initially refused to participate in the survey were contacted by phone. Approximately 80 pct of these respondents ultimately supplied data. Adjustments for those mine establishments that did not supply the data, or supplied partial data, are explained in the "Estimation Procedures" section and in appendix C.

DATA CODING, ENTERING, AND EDITING

The returns underwent a very comprehensive review and editing process in order to (1) minimize the reporting differences among the respondents (establishments), (2) ensure consistency of coding among the individual worker entries, (3) ensure the accuracy of the data entry, and (4) ensure compatibility of occupation and equipment coding with the MSHA injury data base.

ESTIMATION PROCEDURES

In a simple random sampling plan, all units are sampled with the same sampling ratio. To derive the population estimates, the sample units are weighted (replicated) by the inverse of the sampling ratio. Because of efficiency consideration, the data for this demographics study were collected using a complex survey design. Hence, the data for each worker, the ultimate sampling unit, were not equally weighted. Instead, the population estimates were derived by weighting data for each worker with the appropriate final weight which of the data, was the product of the following three factors: (1) the inverse of the sampling ratio with which the primary sampling unit (establishment) was sampled; (2) a nonresponse adjustment factor that was computed separately for each sampling stratum and assigned to all responding establishments in a stratum to account for those establishments in that stratum that did not respond; and (3) the inverse of the sampling ratio with which the secondary sampling units (workers) were selected. A detailed discussion of the different weights and estimation formulas are given in

appendix C. In statistical terms, the survey's estimates of the population total were based on a Horvitz-Thompson estimator (*6*).

No adjustment was made for partial nonresponse. That is, the characteristics that were left blank by the respondents were coded as unspecified and were, naturally, weighted by their appropriate final weight in computing the population estimates. The percentage unspecified for a particular characteristic gives the user an indication of the completeness of the schedules.

GROUPING OF CHARACTERISTICS

The original data base has detailed data for the characteristics mentioned below. For purposes of publication, the detailed data were combined into groups. Please contact the authors to obtain detailed data or a different grouping of the data for any or all of the characteristics.

Job Title and Principal Equipment Operated

Since the original data base has about 100 codes for each of these two categories (see appendixes A and B), the entries were combined into 20 to 25 groups. Similarities of the job title or principal equipment operated and number of workers in each entry were two of the main criteria used in forming the groups.

Employment Size Class

The classes used for this characteristic are the standard size class definition used by MSHA. Because there were very few mines for the size class having 1,000 or more employees, the estimates for this class were computed separately and then were combined with the estimates for employment size class 500 through 999 in order to protect the confidentiality of the mines as well as the workers. The combined size class is labeled as 500+.

Present Job, Present Company, and Total Mining Experience

The data for all three of these characteristics were coded only as the number of years. It was felt that data were not reliable enough to be accurate to the month. The groupings were formed to be as compatible as possible to the groupings used by MSHA for its injury statistics.

Job-Related Training During the Last 2 Years

The grouping for this characteristic was formed to reflect the definite and logical intervals that various mine operators employ and that meets the need of the mine safety personnel. The most frequently reported number was 16 h for training during the last 2 years; this is because MSHA requires a minimum training of 8 h/yr. Also, MSHA and safety personnel are interested in knowing the percent of workers who receive no training. Hence, both 0 and 16 h were categorized separately.

Age

The groupings for age were formed to be about the same as what MSHA uses for its injury statistics.

RELIABILITY OF ESTIMATES

As stated in reference 7:

> All estimates derived from a sample survey are subject to sampling and nonsampling errors. Sampling errors occur because observations are made on a sample, not on the entire population. Estimates based on the different possible samples of the same size and sample design could differ. Nonsampling errors in the estimates can be attributed to many sources, e.g., inability to obtain information about all cases in the sample, mistakes in recording or coding the data, definitional difficulties, etc.

Nonsampling errors occur in a census as well as in a sample survey. As mentioned earlier, the completed forms underwent a very comprehensive review and edit process. This was primarily done to minimize the nonsampling errors.

In a probability sample, the coefficients of variation (CV's), which are a measure of the sampling errors in the estimates, can be estimated from the survey data. CV's were calculated for the basic characteristics as part of the survey estimation process; these CV's as well as the corresponding estimates for number of workers are given in tables E-41 through E-48. The CV's for other estimates can also be derived if requested. The methodology used to compute the estimated CV's is given below.

By definition, the CV of any sample estimate is equal to the standard error of the estimate divided by the value of the estimate (*8*). In other words, it is a measure of relative variation. Because the survey data will be used by numerous researchers to measure different statistics (e.g., totals, means, medians, percentages) by various cross-classification categories, it was not feasible to use the exact formula for the standard error estimates. Hence, a generalized formula that approximated the exact formula and that was easy to implement for computing all the standard error estimates was developed. It should be noted that since the survey uses a complex sampling design, the usual variance, standard deviation, and standard error estimates computed by the software packages are no longer valid because they are based on simple random sample design. The reliability measures for this survey were computed by employing a random group variance technique. A brief description of it is given in appendix D and a detailed discussion is given in reference 9.

The purpose of producing a reliability measure for this report is to define the confidence interval or range that would include the comparable complete coverage value. For example, the total number of estimated truck drivers for the 1986 nonmetallic mining industry was 1,565 (table E-1 and E-42) with a CV of 12.0 pct (table E-42). Based on this information, the standard error on the total number of truck drivers is 188 (estimate $\times$ CV = 1,565 $\times$ 0.120) and the 95-pct confidence interval is 1,189 to 1,941 (1,565 $\pm$ 2 $\times$ 188). This means that with 95 pct confidence, it can be said that the interval 1,189 to 1,941 includes the total number of truck drivers in the nonmetallic mining industry that would have been obtained from a census of the frame.

In general, the smaller the subpopulation size, the larger the variability in the estimates. Additionally, the larger the nonresponse, the less reliable the estimate may be. As mentioned earlier, nonresponse error is considered a nonsampling error. This error occurred more frequently for estimates of job-related training during the last 2 years and total mine experience than for other variables because conceptually these variables are harder to report. Moreover, it is possible that the training estimates might be somewhat biased because many respondents filled in 16 h, the minimum number of hours required by MSHA over a 2-year period.

VALIDATION OF ESTIMATES

Once the estimates were produced, they were validated for accuracy and reasonableness by several mining industry specialists. Additionally, the total employment for each industry was compared to an independent census conducted by MSHA, the results of which are reported in references 10 through 14. The injury experience reports tabulate the injury-illness-fatality data reported to MSHA on form 7000-1 and employment data reported on form 7000-2. While the data base used to compile the statistics for these reports contains detailed information for the injured victims, it does not contain similar information for the entire workforce. The breakdown of total employment is available only by type of ore mined, employment size class, and work location. Hence, the MIPS was conducted so that MSHA injury data could be analyzed in greater detail.

The data show that the overall employment figures from the two sources differed about 1 pct for the nonmetallic mining industry, with the MSHA figures being higher than those of the demographic survey. The difference in the estimates is caused in part by differences in reporting, coverage period, definitions, and methodology as explained below for data comparison by employment size class and by work location.

When comparing distribution of workers by employment size class, the differences between the data of the total row of table E-1 of this report and MSHA data as stated in table 4 of reference 13 are substantial. This is mainly due to the differences in definition and methodology. The MIPS classification is based on total employment of an establishment as it existed when the respondents filled out the questionnaire. MSHA collects employment on a quarterly basis, and for each quarter it is possible for the employment to be broken into a maximum of four different work locations; hence, each establishment may have up to 16 different employment figures.

Per MSHA's methodology, the size groups are classified according to the lowest numbered (primary) subunit's average employment of four quarters and *not on the total employment* of an establishment, as is the case with the MIPS. For example, if an establishment's annual average employment is 60, but the employment for the primary subunit, say underground, is 15, then the establishment per MSHA's methodology is classified in size class 1 through 19, whereas according to the MIPS procedure it is in size class 50 through 99. It is for this reason the average employment per operation as stated in table 4 of reference 13 is 4.1 for size class 1-4. It should be noted that MSHA classification overestimates the employment in smaller size classes.

In view of the above, the injury data as published in reference 13 by size class should not be analyzed against the MIPS employment size class data. Instead, the analyst needs to retabulate the MSHA injury data from the original data tapes so that the size class definition corresponds to the MIPS.

Also, a large difference existed between MIPS and MSHA figures for employment distribution by work location. This is primarily due to differences in reporting. The employment reported to MSHA every quarter is in aggregate numbers for each work location (maximum of four). Generally, this type of reporting results in gross approximations in the breakdown of variables such as employment. For the MIPS data, the work location was reported for each worker in the sample, in the same manner as it is reported to MSHA on form 7000-1 for each injured worker. It should be noted that the data on work location for individual workers is known with more specificity than for the whole population. Hence, it is appropriate to analyze the survey work location data with MSHA injury statistics.

Additionally, a small portion of the difference in the two estimates is due to the job title category of office workers. The MIPS underestimated the number of employees in this category because many respondents assumed that these workers very seldom incur injuries and therefore were not to be reported. For the purposes of injury analysis, the office workers are to be excluded because of some of the obvious difference in the injury risk. Hence, the difference in counts of office workers does not make any difference.

SUMMARY OF MAJOR FINDINGS

The findings of the survey by various cross-classifications are given as estimates in tables E-1 through E-40; tables E-41 through E-48 give reliability estimates for the basic characteristics and a detailed discussion of their use is given in the "Reliability of Estimates" section. If desired, the estimates by some other classification criteria including more detailed estimates (e.g., distribution of workers by age and experience at present company working at the plant or mill location) can be derived from the original data base. The following findings are based on the data for the entire 1986 nonmetallic mining workforce.

- The total estimated workforce for 1986 was approximately 33,400 (table E-1). The data in table E-1 also indicate that 24 pct of the workforce was employed in establishments with 49 or less employees, 40 pct in establishments with 50-249 employees, and 36 pct in establishments with 250 or more employees.
- The largest category of workers was plant operator-warehouseman with 20 pct of the employment; followed closely by mechanic-welder-oiler-machinist with 18 pct, and laborer-miner-utility man with 12 pct (table E-1). Each of the remaining occupation groupings had fewer than 10 pct of the employees.
- The distribution of workers by job title varied greatly according to the employment size class (table E-1). For example, the front-end loader-forklift operator, and truck driver category constituted 11 and 18 pct, respectively, of the workforce in employment size class 1-19, however, in the size class 500+ they each represented only 1 pct of the workforce. Mechanic-welder-oiler-machinist, on the other hand, made up only 7 pct of the employment in size class 1-19 and 25 pct in size class 500+.
- The distribution of workers by work location was underground mine, 11 pct; surface at underground mine, 5 pct; surface mine, 34 pct; plant or mill, 41 pct; office, 9 pct (table E-3). The data in table E-3 also show that four distinct distributions exist by size class 1-19, 20-99, 100-499, and 500+.
- Of the female employees, 54 pct had the job title category office worker, compared with 4 pct of the males (table E-15).

The following findings are based on nonmetallic mining data that exclude the job title category of office worker.

- The largest category of equipment operated was handtools (powered and nonpowered) with 21 pct of the employment, followed closely by the category none with 19 pct, and plant equipment with 17 pct.
- The median experience at present job, present company, and total mining were 5, 9, and 10 years, respectively (table E-4). The data also show that workers employed in establishments with 250 or more employees had higher median experience in all three categories than those employed in establishments with less than 250 employees.

- Mean job-related training during the last 2 years was 44 h and it varied greatly by size class (table E-5).
- Mean age was about 39 years across all size classes (table E-6). The age group 40-49 had the largest number of workers (6,926), followed closely by the 50 and over age group (6,632); these two groups made up about 43 pct of the workforce.
- Males made up 97 pct of the workforce (table E-7). Note that the 97-pct figure excludes the unspecified category.
- Whites, blacks, and Hispanics made up 75, 15, and 8 pct, respectively, of the workforce (table E-7). The remaining 2 pct workers belonged either to another race or were unspecified.
- Of those workers whose education was specified, 74 pct had a high school or better education (table E-7). Note that this figure is obtained by (1) summing the workers in the categories high school diploma, vocational diploma, some college, and college degree, and (2) dividing this sum by the total number of workers minus the workers in the unspecified category. In this case, it is 21,308 divided by 28,633.
- The distribution of males and females by principal equipment operated is shown in table E-21. Handtools (powered and nonpowered) was the principal equipment operated category for males (22 pct) compared with 6 pct for females; scale-lab equipment-controls, on the other hand, were operated by 13 pct of the females and by 5 pct of the males.

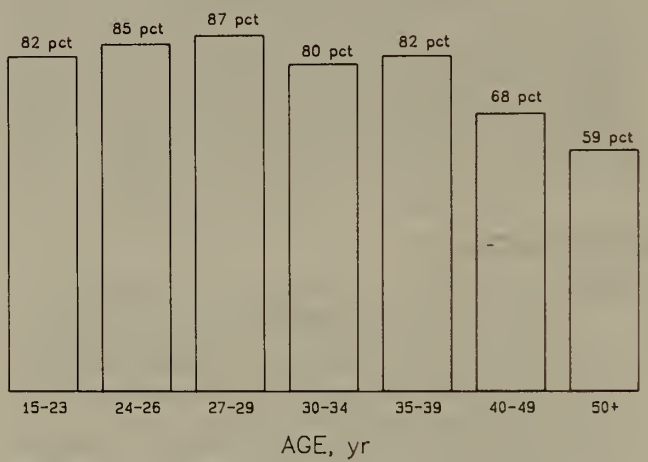

Figure 1.—Percentage of 1986 nonmetallic mining workforce with at least a high school diploma, by age (excluding job title category of office worker, as well as workers whose education was unspecified.

- Education and median experience at the present company were inversely related (table E-37); that is, on the average, the less educated the person was, the longer he or she was employed with the company.
- There was a higher percentage of employees with at least a high school education under the age of 40 than there were of age 40 and over (table E-38 and figure 1); education, categorized by sex (table E-39), and race (table E-40) are shown in figures 2 and 3, respectively.

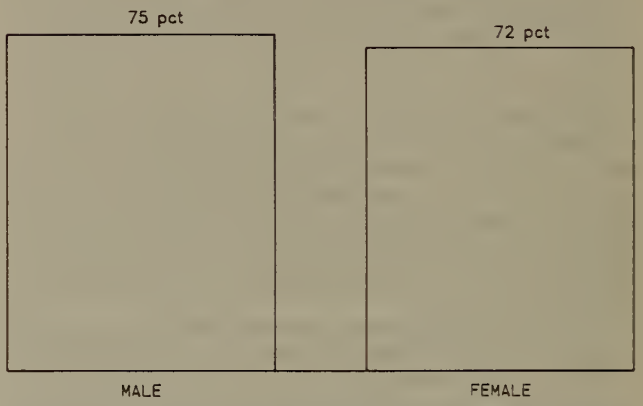

Figure 2.—Percentage of 1986 nonmetallic mining workforce with at least a high school diploma, by sex (excluding job title category of office worker, as well as workers whose education was unspecified.

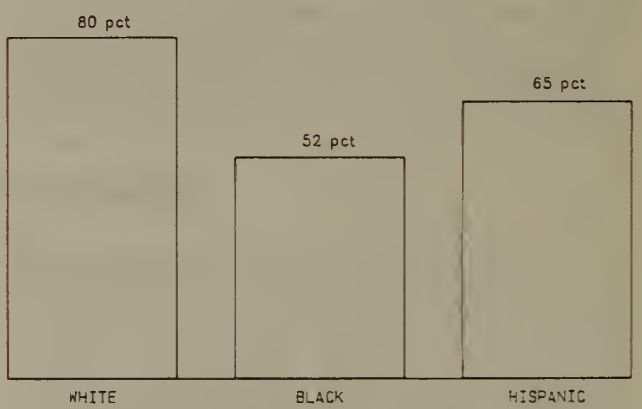

Figure 3.—Percentage of 1986 nonmetallic mining workforce with at least a high school diploma, by race (excluding job title category of office worker, as well as workers whose education was unspecified.

APPLICATION OF DATA FOR INJURY ANALYSES

The ultimate objective of this study is to provide a basis for—

1. Analyzing the 1986 MSHA nonmetallic mining injury statistics and identifying those subpopulations exhibiting higher or lower than average injury rates.

2. Producing some selected estimates by geographic location such as regions (east, central, west), MSHA districts, or States, and performing injury data analyses.

3. Developing an easy to use computerized data base that would be available to the researchers to do their own analyses especially in the area of targeting injury prevention and training efforts.

The results from these analyses, which encompass all facets of mining operations, can help identify areas where research efforts should be devoted to achieve the greatest safety improvements, thus preventing creation of unnecessary regulations or crash research programs that tend to waste funds.

RECOMMENDATIONS FOR FUTURE WORK

1. After the injury analyses are performed, and the hazardous areas or subpopulations have been identified, it would be desirable to further investigate their problems and needs. This can be accomplished by conducting some special surveys such as an equipment use survey, maintenance related work survey, small mines survey, etc.

2. Repeat the MIPS and perform the injury analyses periodically, say every 3 to 5 years, in order to study the changing mining environment and its impact on mining safety and productivity. When the survey is repeated, it is recommended that modifications be made to the questionnaire to reflect new needs. It is also recommended that the collection of total mine experience and job-related training data be eliminated, since these variables are conceptually very hard to measure. Also, the variables experience on the job and experience with the company should be measured in years only.

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APPENDIX A.—NONMETALLIC MINING INDUSTRY JOB TITLE GROUPING

Description	*Job title code*
Backhoe-crane-dragline-shovel operator	367, 378, 778, 387
Beltman-belt repairman	601, 1012, 996
Blaster	807
Deckhand-barge and dredge operator	372
Dozer-heavy and mobile equipment operator	368, 768, 985
Driller-rock bolter	33, 34, 333, 334, 1056, 46
Electrician-lampman	402, 602, 603, 385
Front-end loader-forklift operator	382, 782, 825, 389
Grader-scraper operator	375, 775, 957
Laborer-miner-utility man	616, 53, 316, 36, 38, 39, 45, 57, 58, 59, 158, 216, 224, 327, 386, 395, 609, 624, 663, 710, 716, 874, 997, 1013, 1055
Manager-foreman-supervisor: General	430, 449, 481, 489, 494
Manager-foreman-supervisor: Maintenance	418
Manager-foreman-supervisor: Working	749
Mechanic-welder-oiler-machinist	404, 604, 605, 1019, 1018, 1060, 394, 608
Mine technical support	320, 393, 396, 414, 423, 456, 464, 495, 593, 594, 920, 921, 930, 965, 998, 1014
Office worker	497
Plant operator-warehouseman	374, 379, 380, 388, 390, 392, 1022
Shuttle car-tram operator	850, 28, 29, 269, 373, 728, 962, 969
Stone cutter-finisher	398, 399
Truck driver	376, 776

Code	*Description*
28	Scoop tram operator
29	Mucking machine operator
33	Driller helper, underground
34	Exploration driller, underground
	Longhole driller, underground
	Prospect driller, underground
	Diamond driller, underground
36	Continuous miner operator
38	Cutting machine operator
39	Hand loader
	Trammer
45	Hangup man
	Rockman
	Raise blaster
	Chute blaster
	Rock handler
46	Pinner
	Truss bolter
	Rock bolter
	Roof trimmer
	Roof man
	Scaler operator
	Roof bolter
53	Nipper
	Utility man
57	Stope miner
58	DXC miner
	Drift miner
59	Raise miner
158	Rock machine operator, underground
216	Trackman
224	Trainees, underground

Code	*Description*
269	Chute puller, underground
	Locomotive operator
	Car loader underground
	Whistle punk, underground
316	Service truck operator
	Laborer
	Track gang, surface
	Surface worker
	Utility man, surface
	Pumper, surface
	Tamping machine operator
320	Cage attendant, surface
	Aerial tram—outside only
327	Surface miner
333	Driller helper
334	Carriage-mounted drill operator, surface
	Wagon drill operator, surface
	Churn driller, surface
	Rotary drill operator
	JP drill operator, surface
	Air-track driller, outside only
367	Backhoe operator
	Power shovel operator
	Pitman
368	Dozer operator
	Track operator helper, surface
	Tractor operator, surface
372	Deckhand
	Dredge operator
	Barge attendant
	Barge loader
	Boat operator

Code	Description
373	Car dropper
374	Storekeeper
	Blunger
	Process operator
	Sandbox operator
	Mill operator
	Reagent operator
	Car loader, surface
	Warehouseman
	Shipping
	Media operator
	Breakerman
	Crusher operator
	Sewing machine operator
	Boney preparation plant operator
	Packaging
	Cleaning plant operator
	Truck loader
	Bagger-baler
	Preparation plant operator
	Cobber
375	Grader operator, surface
376	Truck driver, surface
378	Dragline operator
	Dropball operator
	Crane operator, surface
379	Kiln operator
	Calciner
	Dryer operator
380	Fine coal plant operator
382	Loader operator
	Front-end loader operator, surface
	Pan operator
	Scraper operator
	Highlift operator
	Payloader operator
385	Lampman
386	Refuse truck driver
387	Rotary bucket excavator operator
388	Separator operator
	Scalper
	Shaker operator
	Screen operator
389	Forklift operator
390	Silo operator
392	Washery operator
	Topman
	Skip dumper
	Binman
	Scrubber operator
	Tipple operator-attendant
393	Scaleperson
	Weighman-weighmaster
394	Carpenter
395	Water truck operator
396	Watchman
	Security guard
398	Sawyer
	Stone finishing
399	Dimension stone cutter-polisher
402	Master electrician
404	Master mechanic

Code	Description
414	Laboratory assistant
	Analyst
	Laboratory technician
	Laboratory supervisor
	Quality control
	Dust sampler
	Emission control specialist
418	Maintenance supervisor
	Maintenance foreman
423	Surveyor
430	Assistant mine manager
	Assistant mine foreman-vice president
449	Mine owner
	Assayers
	President
	General foreman
	Mine manager
	Mine foreman
456	Engineer
	Metallurgist-geologist
	Chemist
464	Inspector
481	Superintendents
	Project managers
	Coordinators
	Supervisors
489	Outside foreman
494	Plant manager
	Mill manager
	Plant foreman
	Mill foreman
495	Safety coordinator
	Safety manager
	Safety director
	Environmental coordinator
	Safety engineer
497	Office help
	Computer operator
	Controller
	Clerk
593	Nurse
594	Training specialist
601	Conveyor man
	Belt walker
	Belt installer
	Tunnel worker
	Tailpiece man
	Belt mover
	Mobile bridge carrierman
	Beltman
602	Lineman
	Electrician
603	Electrician helper
604	Fueler
	Boilermaker
	Plumber
	Pipefitter
	Boiler operator
	Pipe man
	Boiler trainee
	Mechanic
	Repairman
	Mill wright

Code	Description
605	Mechanic helper
608	Mason
609	Supplyman
	Material man
616	Rock picker
	Parts runner
	Groundman
	Unit helper
	Bathhouse attendant
	Pointman
	Laborer
	Slate picker
	Roustabout
	Extra man
624	Trainees
	Apprentice
663	Ledgeman
	Quarry man
	Miner, not elsewhere classified
	Shaft miner
	Probeman
710	Propman
	Timberman
716	Cement man
	Form man
	Grizzly tender
728	Gizmo operator
	Load-haul-dump operator, underground
749	Shift boss
	Foreman-leadman
	Bullgang foreman
	Labor foreman
	Section boss-foreman
768	Heavy equipment operator
775	Grader operator, underground
776	Truck driver, underground
778	Cherry picker
	Crane operator, underground
	Dragline operator, underground
	Backhoe operator, underground
	Gradall operator
	Front-end loader operator, underground
807	Chargeman
	Shot firer
	Powder man
	Blaster
	Airdox operator
	Loading hole shooter
	Powder monkey

Code	Description
825	Bobcat operator
850	Ramcar operator
	Shuttle car operator
	Buggy operator
874	Mine equipment operator
920	Cager
921	Hoist operator
	Hoist engineer
	Shaftman
930	Skip tender
957	Scraper operator
962	Car runner, surface
	Trip rider
	Brakeman
	Flagman
	Car rider
	Conductor
965	Dispatcher
969	Swamper
	Motorman
	Switchman
985	Heavy equipment operator, surface
	Mobile equipment operator, surface
996	Feeder man
997	General or many equipment operator
998	Janitor
	Bag stenciler
	Prospector
	Painter
1012	Belt repairman
	Belt vulcanizer
1013	Cleanup man
1014	Sampler
1018	Lube man
	Greaser-oiler
1019	Welder
1022	Dump man
	Dump operator
1055	Chainman
1056	Rock driller
1060	Machinist
	Shopman
	Shop foreman
	Bit sharpener

APPENDIX B.—NONMETALLIC MINING INDUSTRY EQUIPMENT OPERATED GROUPING

Description	*Equipment code*
Backhoe-crane-dragline-shovel	16, 14
Belt	13, 96
Dozer-heavy and mobile equipment	8, 85
Drill (underground)-rock bolter	53, 54, 49
Drill (surface)	9
Explosives	47
Front-end loader-forklift	24, 23
Grader-scraper	52, 57
Handtools (powered and non-powered)	28
Hoist-elevator	30, 19, 38
Many equipment	97
Miscellaneous utility equipment	95, 12, 16
Plant equipment	40, 7, 10, 11, 15, 18, 22, 26, 32, 39, 46, 51, 58, 69, 82, 83
Pump	48
Scale-lab equipment-controls	92, 80, 91
Shuttle car-locomotive	61, 34, 33, 41, 42, 43, 65
Stone cutter-finishing machine	17
Truck (haulage)	44, 45
Truck (utility)-personnel carrier	67, 37, 66
Welding machine-lathe	70, 5
None	0
Not elsewhere classified	98, 68, 71, 81, 88
Unspecified	99

Code	*Description*
0	None
5	Drill press
	Bench grinder
	Lathe
7	Boats
	Barges
	Water transportation
8	Bulldozer
	Dozer
	Crawler tractor
9	Carriage mounted drill
	Jumbo drill
	Churn drill
	Rotary drill
	Jet piercing drill
	Airtrack compressor drill
10	Chute
	Airslide
11	Classifier
	Cyclones
12	Continuous miner
	Dosco miner
13	Belt feeder
	Mobile bridge carrier
	Conveyor
	All types belts
14	Cherry picker
	Basket scaler
	Scaling machine
	Rock or dropball
	Boom hoist
	Derrick
	Crane
	Gantry

Code	*Description*
15	Breaker
	Crusher
16	Cutting machines
	Undercutter
	Chain cutter
17	Polishing machinery
	Dimension stone cutting
18	Dredge
19	Elevator
	Buckets
	Cage
	Skip
22	Precipitator heavy media bath
	Filters
	Flotation machines
23	Forklift
24	Highlift
	Skip tender
	Front-end loader
	Payloader
26	Grizzlies
28	Handtools (powered and nonpowered)
	Ram jack
30	Hoist
	Car dropper
	Hydraulic jack
32	Impactor
33	Scoop tram
	Unitrac
	Load-haul-dump
	Teletram car
	Bobcat, underground

Code	Description
34	Locomotive
	Trammer
	Tow-motor
	Lorry car
	Rail-mounted locomotive
37	Porta bus
	Mancar
	Golf cart
	Mantrip
	Rail runner
	Rail rover
	Personnel carrier
	Boss buggy
	Jeep
38	Man lift
	Scaling ring
39	Grinding mills
	Ball or rod mills
40	Milling machinery
	Block press
	General plant equipment
41	Nipper truck, underground
	Mine car, underground
	Underground flatcar
	Timber truck, underground
42	Mine car, surface
	Ore-coal car, surface
	Boxcar, surface
	Hopper car, surface
43	Mucking machine
	Overshot loader
44	Ore haulage trucks, offhighway
45	Payloader ore haulage, onhighway
46	Bagger
	Sewing machine
	Packaging machine
47	Pneumatic blast agent loader
	Pop shooter
	Driller loader
	Prill loader
	Powder buggy
	Explosives
48	Pump
49	Raise borer
51	Raw coal storage
	Tipple
	Dump bins
52	Roadgrader
	Motor grader
	Motor patrol
53	Jackleg
	Drifter drill
	Airleg
	Diamond drill
	Track drill
	Jumbo drill
	Rock drill
	Buzzy drill
	Jackhammer
	Hydraulic drill
	Stoper drill

Code	Description
54	Pinner
	Roof bolting machine
57	Pan scraper
	Scoop, surface
	Self-loading scraper
	Tractor scraper
	Scraper loader
58	Shaker
	Vibrator
	Screen
60	Dragline
	Dragline bucket
	Backhoe
	Power shovel
	Clamshell
61	Buggy
	Shuttle car
	Ram car
65	Track maintenance
	Track repair equipment
66	Tractor, underground
	Elkhorn
	Supply car
67	Trash truck
	Service truck
	Utility truck
	Water truck
	Dump truck
	Pickup truck
68	Tugger
	Air winch
69	Washers
70	Welding machine
	Torch
71	Machines, not elsewhere classified
	Rock rake
	Drilling rigs
	Impact roller
80	Lab equipment
81	Rigs, not elsewhere classified
82	Boilers
83	Furnaces
	Calciners
	Kilns
	Dryers
85	Heavy equipment
	Mobile equipment
88	Diesels
91	Controls
	Consoles
92	Scales
95	Miscellaneous utility equipment
96	Feeders
97	Many-all types of equipment
98	Not elsewhere classified
99	Not specified

APPENDIX C.—ESTIMATION PROCEDURES

Establishment weight.—Suppose one out of every five mine establishments in a sampling stratum (industry-mine type-employment size class-status) was selected. Then, the sampling ratio is 1-5, and the establishment weight (EWT) is 5.00, the inverse of the sampling ratio.

Nonresponse adjustment factor.—Also suppose in a given sampling stratum, 80 pct of the establishments that were within the scope of the survey responded. Then, the nonresponse adjustment factor (NRAF) is 1.25 (i.e., 100/80).

Worker weight.—Additionally, there was the sampling ratio with which the workers in the establishment were sampled; the worker weight (WWT) ranged from 1.00 to 30.00 (see the first page of the MIPS questionnaire in appendix F). Theoretically, all the workers in a sampling stratum should have had the same weight. Hence, there would have been no need to assign weight at the worker level, as the worker weight could have been incorporated into the establishment weight. In practice, however, this is seldom the case because for a few establishments the employment level changes from what it was on the sampling frame to the time of the survey data collection. Since all the establishments did not report in the same employment size class that they were sampled in, it was necessary to also assign each worker a weight.

Final weight.—For the purpose of computing the estimates, each worker was assigned a final weight (FWT) which was the product of establishment weight (EWT), nonresponse adjustment factor (NRAF), and the worker weight (WWT). That is, FWT = EWT × NRAF × WWT.

Estimates of number of workers.—The estimates of the total number of workers were computed by (1) summing the final weights over the appropriate domain, and (2) rounding the sum to the nearest integer.

Example: To estimate the total number of truck drivers:

1. Compute $x = \sum_{i \varepsilon D} FWT_i$.

   Where the domain, D, was the set of all records (workers) that had an occupation code of truck driver.

2. Compute y = round (x).

Estimates of mean.—The estimates of mean age (training) were computed by summing over the appropriate domain (1) the product of age (training) and final weight, (2) the final weights, and then (3) dividing the sum of the products by the sum of the weights and rounding the result to the nearest whole number. It should be noted that for each domain only those entries where age (training) was specified were included in the computation.

Example: To estimate the mean age of the truck drivers:

1. Compute $x = \sum_{i \varepsilon D} (Age_i * FWT_i)$.

2. Compute $y = \sum_{i \varepsilon D} FWT_i$.

   Where domain, D, is the set of all records that had an occupation code of truck driver with age being specified.

3. Compute z = round (x/y).

Estimates of median.—The estimates of median job, company, and mining experience were derived by (1) sorting over the domain the records in ascending order of the experience for which the median statistic was desired, (2) computing the total number of workers (NW) in the domain by summing the final weights, and (3) selecting the experience corresponding to the middle worker(s) in the ordering. That is, if NW is an odd number, then the median experience is the experience corresponding to the (NW/2 + 1)th worker in the ordering; if NW is an even number, then the median experience is the midpoint (rounded to the nearest integer) of the experience corresponding to the (NW/2)th and (NW/2 + 1)th worker in the ordering. As with the mean estimates, the median estimates also excluded those entries in the domain with unspecified experience.

APPENDIX D.—RELIABILITY OF ESTIMATES: RANDOM GROUP VARIANCE TECHNIQUE

The random group method of variance estimation employed in this study consisted of selecting eight samples using the same sampling scheme for each sample as the parent sample. The primary sampling units (establishments) were divided into two sets. The first set consisted of noncertainty (probability of selection less than 1.00) primary sampling units sorted by their original industry-mine type-employment size class-status. A random integer, say j, between 1 and 8 was generated. The first primary unit in the ordering was assigned to the random group j, the second to the random group j + 1, and so forth in a modulo 8 fashion. Then, the secondary sampling units (workers) were assigned the same random group number as the primary unit to which they belonged. The second set consisted of all secondary sampling units belonging to the certainty (probability of selection equal to 1.00) primary sampling units. The secondary sampling units were sorted by the same scheme as above, and a random integer, say k, between 1 and 8 was generated. Then, the first secondary unit in the ordering was assigned to the random group k, the second to the random group k + 1, and so forth in a modulo 8 fashion. Hence, each worker belonged to a random group. For a more detailed discussion of the random group technique, the reader is referred to reference 9 of the main text.

The following procedure was followed in computing the estimated variance (var), standard error (s), and the coefficient of variation (CV) for the estimated number of workers belonging to a particular category.

1. The domain (i.e., category) was defined.
2. A separate estimate for total number of workers, $\hat{\theta}_i$, for each of the eight random groups was computed. If any random group was empty, then a zero was assigned to that random group.
3. Total number of workers, $\hat{\theta}$, for all eight groups was computed as
$$\hat{\theta} = \hat{\theta}_1 + \hat{\theta}_2 + \ldots + \hat{\theta}_8.$$
4. The mean number of workers per group was computed as
$$\bar{\hat{\theta}} = \hat{\theta}/8.$$
5. The variance for $\hat{\theta}$ was computed as
$$\text{var}(\hat{\theta}) = 8 \sum_{i=1}^{8} \frac{(\hat{\theta}_i - \bar{\hat{\theta}})^2}{7}.$$
6. The standard error of $\hat{\theta}$ was computed as
$$s(\hat{\theta}) = \sqrt{\text{var}(\hat{\theta})}.$$
7. The CV for $\hat{\theta}$ was computed as
$$CV(\hat{\theta}) = \frac{s(\hat{\theta})}{\hat{\theta}} \times 100.0.$$

APPENDIX E.—NONMETALLIC MINING 1986 WORKFORCE ESTIMATES

Table E-1.—Nonmetallic mining 1986 workforce estimates: job title, by employment size class[1]

Job title grouping[2]	1-19		20-49		50-99		100-249		250-499		500+		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct
Backhoe-crane-dragline-shovel operator	142	4	190	5	68	2	184	2	241	4	158	2	983	3
Beltman-belt repairman	0	0	22	1	0	0	38	0	27	0	60	1	146	0
Blaster	15	0	12	0	9	0	12	0	0	0	30	0	77	0
Deckhand-barge and dredge operator	5	0	0	0	0	0	63	1	0	0	0	0	68	0
Dozer-heavy and mobile equipment operator	265	7	114	3	149	3	299	3	109	2	156	2	1,092	3
Driller-rock bolter	95	2	85	2	73	2	168	2	76	1	60	1	558	2
Electrician-lampman	37	1	35	1	29	1	245	3	136	2	126	2	608	2
Front-end loader-forklift operator	408	11	190	5	132	3	371	4	145	3	40	1	1,286	4
Grader-scraper operator	89	2	95	2	158	4	19	0	0	0	0	0	361	1
Laborer-miner-utility man	356	9	332	8	545	13	1,199	13	709	13	904	14	4,046	12
Manager-foreman-supervisor:														
General	425	11	318	8	335	8	454	5	222	4	398	6	2,152	6
Maintenance	27	1	52	1	49	1	174	2	145	3	90	1	537	2
Working	78	2	175	4	183	4	426	5	264	5	392	6	1,519	5
Mechanic-welder-oiler-machinist	253	7	574	14	715	16	1,520	17	1,194	22	1,673	25	5,929	18
Mine technical support	133	3	271	7	329	8	883	10	521	9	862	13	3,000	9
Office worker	321	8	264	7	197	5	659	7	381	7	534	8	2,356	7
Plant operator-warehouseman	464	12	979	24	1,136	26	1,947	22	1,253	23	962	15	6,742	20
Shuttle car-tram operator	15	0	33	1	65	1	120	1	42	1	120	2	394	1
Stone cutter-finisher	15	0	0	0	0	0	0	0	0	0	0	0	15	0
Truck driver	681	18	320	8	188	4	266	3	51	1	58	1	1,565	5
Total	3,825	100	4,062	100	4,360	100	9,049	100	5,514	100	6,625	100	33,434	100

[1]MSHA size groups are based on the annual average employment of the primary subunit and not on the total employment; hence, MSHA published injury statistics by size groups should not be analyzed against these data.
[2]As defined by MSHA; see appendix A for detailed explanation of job title grouping.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-2.—Nonmetallic mining 1986 workforce estimates:[1] principal equipment operated, by employment size class[2]

Equipment operated grouping[2]	1-19		20-49		50-99		100-249		250-499		500+		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct
Backhoe-crane-dragline-shovel	157	4	190	5	68	2	205	2	168	3	98	2	887	3
Belt	5	0	22	1	0	0	43	1	27	1	60	1	157	1
Dozer-heavy and mobile equipment	255	7	128	3	162	4	233	3	109	2	216	4	1,102	4
Drill (underground)-rock bolter	5	0	38	1	5	0	111	1	56	1	60	1	275	1
Drill (surface)	80	2	48	1	68	2	86	1	32	1	0	0	313	1
Explosives	15	0	12	0	9	0	12	0	0	0	30	0	77	0
Front-end loader-forklift	539	15	318	8	230	6	563	7	145	3	120	2	1,915	6
Grader-scraper	116	3	136	4	172	4	83	1	0	0	0	0	506	2
Handtools (powered and nonpowered)	289	8	585	15	778	19	1,803	21	1,290	25	1,819	30	6,564	21
Hoist-elevator	25	1	5	0	60	1	47	1	28	1	38	1	203	1
Many equipment	110	3	11	0	109	3	70	1	0	0	540	9	840	3
Miscellaneous utility equipment	168	5	230	6	165	4	549	7	595	12	208	3	1,915	6
Plant equipment	452	13	717	19	876	21	1,547	18	1,061	21	652	11	5,304	17
Pump	0	0	11	0	9	0	91	1	48	1	20	0	179	1
Scale-lab equipment-controls	67	2	143	4	185	4	497	6	287	6	328	5	1,506	5
Shuttle car-locomotive	15	0	38	1	36	1	178	2	62	1	60	1	389	1
Stone cutting-finishing machine	15	0	0	0	0	0	0	0	0	0	0	0	15	0
Truck (haulage)	686	20	320	8	188	5	266	3	51	1	58	1	1,570	5
Truck (utility)-personnel carrier	25	1	0	0	34	1	221	3	84	2	240	4	604	2
Welding machine-lathe	22	1	34	1	0	0	181	2	126	2	80	1	443	1
None	443	13	694	18	980	24	1,512	18	825	16	1,383	23	5,837	19
Not elsewhere classified	0	0	17	0	9	0	39	0	60	1	20	0	145	0
Unspecified	16	0	101	3	24	1	52	1	81	2	60	1	333	1
Total	3,504	100	3,798	100	4,163	100	8,389	100	5,133	100	6,091	100	31,078	100

[1]Excluding job title category of office workers.
[2]MSHA size groups are based on the annual average employment of the primary subunit and not on the total employment; hence, MSHA published injury statistics by size groups should not be analyzed against these data.
[3]See appendix B for detailed explanation of equipment operated grouping.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-3.—Nonmetallic mining 1986 workforce estimates: work location at mine, by employment size class[1]

Work location	1-19		20-49		50-99		100-249		250-499		500+		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct
Underground mine	165	4	138	3	220	5	1,119	12	742	13	1,260	19	3,643	11
Surface at underground mine	30	1	15	0	65	1	411	5	392	7	870	13	1,783	5
Surface mine	2,275	59	1,483	37	1,583	36	2,087	23	1,538	28	2,242	34	11,208	34
Plant or mill	962	25	2,073	51	2,187	50	4,504	50	2,317	42	1,591	24	13,634	41
Office	393	10	354	9	304	7	929	10	525	10	662	10	3,167	9
Total	3,825	100	4,062	100	4,360	100	9,049	100	5,514	100	6,625	100	33,434	100

[1]MSHA size groups are based on the annual average employment of the primary subunit and not on the total employment; hence, MSHA published injury statistics by size groups should not be analyzed against these data.

NOTE —Owing to independent rounding, data may not add to totals shown.

Table E-4.—Nonmetallic mining 1986 workforce estimates:[1] experience at job, company, and mining, by employment size class[2]

Experience, yr	1-19		20-49		50-99		100-249		250-499		500+		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct
At present job:														
0< to ≤1	639	18	561	15	715	17	1,706	20	344	7	935	15	4,900	16
1< to ≤2	418	12	540	14	663	16	1,059	13	400	8	601	10	3,681	12
2< to ≤3	342	10	314	8	297	7	651	8	298	6	240	4	2,142	7
3< to ≤5	441	13	446	12	392	9	1,127	13	730	14	576	9	3,711	12
5< to ≤10	764	22	715	19	1,083	26	1,923	23	1,666	32	2,045	34	8,197	26
10< to ≤20	526	15	509	13	625	15	1,150	14	899	18	1,544	25	5,253	17
20<	215	6	125	3	82	2	153	2	116	2	150	2	841	3
Unspecified	159	5	586	15	308	7	620	7	680	13	0	0	2,353	8
Total	3,504	100	3,798	100	4,163	100	8,389	100	5,133	100	6,091	100	31,078	100
Median, yr	5	NAp	4	NAp	5	NAp	4	NAp	6	NAp	7	NAp	5	NAp
At present company:														
0< to ≤1	465	13	285	8	392	9	917	11	102	2	214	4	2,375	8
1< to ≤5	1,175	34	1,003	26	1,183	28	1,719	20	871	17	652	11	6,604	21
5< to ≤10	814	23	931	25	1,202	29	2,435	29	1,397	27	1,911	31	8,691	28
10< to ≤15	443	13	635	17	764	18	1,371	16	964	19	1,930	32	6,108	20
15< to ≤20	210	6	393	10	302	7	955	11	686	13	426	7	2,972	10
20< to ≤25	147	4	284	7	91	2	461	5	539	10	470	8	1,992	6
25< to ≤30	109	3	131	3	66	2	276	3	216	4	116	2	914	3
30<	121	3	130	3	163	4	245	3	358	7	370	6	1,387	4
Unspecified	20	1	5	0	0	0	10	0	0	0	0	0	35	0
Total	3,504	100	3,798	100	4,163	100	8,389	100	5,133	100	6,091	100	31,078	100
Median, yr	6	NAp	6	NAp	7	NAp	8	NAp	12	NAp	11	NAp	9	NAp
Total mining:														
0< to ≤1	304	9	219	6	224	5	437	5	88	2	154	3	1,426	5
1< to ≤5	797	23	666	18	646	16	1,466	17	563	11	546	9	4,684	15
5< to ≤10	723	21	769	20	1,084	26	2,212	26	1,097	21	1,620	27	7,505	24
10< to ≤15	456	13	581	15	662	16	1,331	16	992	19	1,690	28	5,713	18
15< to ≤20	227	6	368	10	273	7	941	11	642	13	494	8	2,945	9
20< to ≤25	123	3	185	5	112	3	457	5	467	9	380	6	1,723	6
25< to ≤30	110	3	164	4	55	1	236	3	204	4	116	2	884	3
30<	161	5	184	5	135	3	252	3	322	6	370	6	1,424	5
Unspecified	603	17	662	17	973	23	1,059	13	757	15	720	12	4,774	15
Total	3,504	100	3,798	100	4,163	100	8,389	100	5,133	100	6,091	100	31,078	100
Median, yr	8	NAp	10	NAp	8	NAp	9	NAp	13	NAp	11	NAp	10	NAp

NAp Not applicable.
[1]Excluding job title category of office workers.
[2]MSHA size groups are based on the annual average employment of the primary subunit and not on the total employment; hence, MSHA published injury statistics by size groups should not be analyzed against these data.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-5.—Nonmetallic mining 1986 workforce estimates:[1] training received, by employment size class[2]

Job training for last 2 yr, h	1-19		20-49		50-99		100-249		250-499		500+		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct
0	318	9	346	9	587	14	323	4	34	1	570	9	2,178	7
1-8	171	5	150	4	66	2	313	4	284	6	380	6	1,363	4
9-15	176	5	0	0	77	2	51	1	76	1	0	0	381	1
16	406	12	560	15	998	24	2,713	32	886	17	1,570	26	7,132	23
17-40	621	18	833	22	1,097	26	2,074	25	680	13	380	6	5,685	18
41-80	500	14	443	12	446	11	1,049	13	1,032	20	140	2	3,609	12
81-160	239	7	151	4	34	1	367	4	474	9	0	0	1,265	4
161+	137	4	100	3	17	0	205	2	61	1	411	7	931	3
Unspecified	936	27	1,215	32	841	20	1,294	15	1,606	31	2,640	43	8,532	27
Total	3,504	100	3,798	100	4,163	100	8,389	100	5,133	100	6,091	100	31,078	100
Mean job training, h	50	NAp	50	NAp	28	NAp	39	NAp	45	NAp	60	NAp	44	NAp

NAp Not applicable.
[1]Excluding job title category of office workers.
[2]MSHA size groups are based on the annual average employment of the primary subunit and not on the total employment; hence, MSHA published injury statistics by size groups should not be analyzed against these data.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-6.—Nonmetallic mining 1986 workforce estimates:[1] age distribution, by employment size class[2]

Age, yr	1-19		20-49		50-99		100-249		250-499		500+		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct
15-20	82	2	24	1	44	1	89	1	14	0	100	2	353	1
21-23	203	6	116	3	284	7	353	4	50	1	156	3	1,162	4
24-26	256	7	323	9	329	8	744	9	264	5	484	8	2,400	8
27-29	379	11	355	9	389	9	1,011	12	539	10	464	8	3,137	10
30-34	580	17	552	15	773	19	1,524	18	927	18	1,069	18	5,424	17
35-39	391	11	508	13	597	14	1,144	14	952	19	1,289	21	4,881	16
40-49	663	19	940	25	899	22	1,791	21	1,210	24	1,423	23	6,926	22
50+	825	24	980	26	848	20	1,696	20	1,178	23	1,106	18	6,632	21
Unspecified	124	4	0	0	0	0	37	0	0	0	0	0	162	1
Total	3,504	100	3,798	100	4,163	100	8,389	100	5,133	100	6,091	100	31,078	100
Mean age, yr	39	NAp	41	NAp	39	NAp	38	NAp	40	NAp	39	NAp	39	NAp

NAp Not applicable.
[1]Excluding job title category of office workers.
[2]MSHA size groups are based on the annual average employment of the primary subunit and not on the total employment; hence, MSHA published injury statistics by size groups should not be analyzed against these data.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-7.—Nonmetallic mining 1986 workforce estimates:[1] sex, race, and education, by employment size class[2]

	1-19		20-49		50-99		100-249		250-499		500+		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct
Sex:														
Male	3,401	97	3,757	99	3,928	94	7,934	95	4,980	97	5,873	96	29,873	96
Female	56	2	31	1	164	4	438	5	153	3	218	4	1,061	3
Unspecified	46	1	10	0	70	2	17	0	0	0	0	0	143	0
Total	3,504	100	3,798	100	4,163	100	8,389	100	5,133	100	6,091	100	31,078	100
Race:														
White	2,864	82	3,015	79	3,201	77	6,462	77	3,241	63	4,544	75	23,327	75
Black	242	7	567	15	793	19	972	12	1,513	29	670	11	4,758	15
Hispanic	327	9	198	5	126	3	711	8	259	5	819	13	2,439	8
Other	45	1	15	0	18	0	221	3	80	2	20	0	399	1
Unspecified	25	1	3	0	25	1	23	0	40	1	38	1	154	0
Total	3,504	100	3,798	100	4,163	100	8,389	100	5,133	100	6,091	100	31,078	100
Education level:														
Some elementary	305	9	318	8	490	12	534	6	294	6	228	4	2,168	7
Some high school	726	21	630	17	713	17	1,067	13	1,158	23	861	14	5,155	17
High school diploma	1,692	48	1,724	45	1,663	40	4,335	52	2,280	44	2,958	49	14,652	47
Vocational diploma	226	6	308	8	390	9	618	7	601	12	420	7	2,563	8
Some college	185	5	227	6	289	7	779	9	497	10	521	9	2,497	8
College degree	170	5	204	5	220	5	376	4	302	6	324	5	1,596	5
Unspecified	199	6	387	10	399	10	680	8	0	0	780	13	2,445	8
Total	3,504	100	3,798	100	4,163	100	8,389	100	5,133	100	6,091	100	31,078	100

Nap Not applicable.
[1]Excluding job title category of office workers.
[2]MSHA size groups are based on the annual average employment of the primary subunit and not on the total employment; hence, MSHA published injury statistics by size groups should not be analyzed against these data.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-8.—Nonmetallic mining 1986 workforce estimates: job title, by principal equipment operated[1], number of workers

Job title grouping[2]	Backhoe crane dragline shovel	Belt	Dozer heavy and mobile equipment	Drill (underground) rock bolter	Drill (surface)	Explosives	Front-end loader forklift	Grader scraper	Handtools (powered and non-powered)
Backhoe-crane-dragline-shovel operator	851	0	60	0	0	0	0	0	40
Beltman-belt repairman	0	146	0	0	0	0	0	0	0
Blaster	0	0	0	0	0	77	0	0	0
Deckhand-barge and dredge operator	0	0	0	0	0	0	0	0	0
Dozer-heavy and mobile equipment operator	16	0	828	0	0	0	85	124	0
Driller-rock bolter	0	0	0	234	295	0	0	0	0
Electrician-lampman	0	0	0	0	0	0	0	0	608
Front-end loader-forklift operator	0	0	5	0	0	0	1,281	0	0
Grader-scraper operator	0	0	0	0	0	0	0	361	0
Laborer-miner-utility man	0	5	91	41	0	0	173	15	279
Manager-foreman-supervisor:									
General	5	0	37	0	0	0	48	0	0
Maintenance	0	0	0	0	0	0	0	0	0
Working	0	0	0	0	0	0	63	6	41
Mechanic-welder-oiler-machinist	0	0	0	0	0	0	0	0	5,479
Mine technical support	15	0	6	0	18	0	0	0	116
Office worker	0	0	0	0	0	0	0	0	0
Plant operator-warehouseman	0	6	75	0	0	0	264	0	0
Shuttle car-tram operator	0	0	0	0	0	0	0	0	0
Stone cutter-finisher	0	0	0	0	0	0	0	0	0
Truck driver	0	0	0	0	0	0	0	0	0
Total	887	157	1,102	275	313	77	1,915	506	6,564

Job title grouping[2]	Hoist elevator	Many equipment	Miscellaneous utility equipment	Plant equipment	Pump	Scale-lab equipment controls	Shuttle car locomotive	Stone cutting finishing machine	Truck (haulage)
Backhoe-crane-dragline-shovel operator	0	0	13	0	0	0	20	0	0
Beltman-belt repairman	0	0	0	0	0	0	0	0	0
Blaster	0	0	0	0	0	0	0	0	0
Deckhand-barge and dredge operator	0	0	0	68	0	0	0	0	0
Dozer-heavy and mobile equipment operator	38	0	0	0	0	0	0	0	0
Driller-rock bolter	0	5	0	0	0	0	0	0	0
Electrician-lampman	0	0	0	0	0	0	0	0	0
Front-end loader-forklift operator	0	0	0	0	0	0	0	0	0
Grader-scraper operator	0	0	0	0	0	0	0	0	0
Laborer-miner-utility man	0	786	1,902	127	50	0	89	0	5
Manager-foreman-supervisor:									
General	0	31	0	22	0	0	0	0	0
Maintenance	0	0	0	0	0	0	0	0	0
Working	0	5	0	44	0	0	0	0	0
Mechanic-welder-oiler-machinist	0	0	0	13	0	0	0	0	0
Mine technical support	105	6	0	0	0	1,436	0	0	0
Office worker	0	0	0	0	0	38	0	0	0
Plant operator-warehouseman	0	7	0	5,029	129	71	5	0	0
Shuttle car-tram operator	60	0	0	0	0	0	275	0	0
Stone cutter-finisher	0	0	0	0	0	0	0	15	0
Truck driver	0	0	0	0	0	0	0	0	1,565
Total	203	840	1,915	5,304	179	1,544	389	15	1,570

See explanatory notes at end of table.

Table E-8.—Nonmetallic mining 1986 workforce estimates: job title, by principal equipment operated,[1] number of workers—Con.

Job title grouping[2]	Truck (utility) personnel carrier	Welding machine-lathe	None	Not elsewhere classified	Unspecified	Total
Backhoe-crane-dragline-shovel operator	0	0	0	0	0	983
Beltman-belt repairman	0	0	0	0	0	146
Blaster	0	0	0	0	0	77
Deckhand-barge and dredge operator	0	0	0	0	0	68
Dozer-heavy and mobile equipment operator	0	0	0	0	0	1,092
Driller-rock bolter	0	0	24	0	0	558
Electrician-lampman	0	0	0	0	0	608
Front-end loader-forklift operator	0	0	0	0	0	1,286
Grader-scraper operator	0	0	0	0	0	361
Laborer-miner-utility man	184	0	237	61	0	4,046
Manager-foreman-supervisor:						
General	160	0	1,849	0	0	2,152
Maintenance	26	6	506	0	0	537
Working	86	0	1,205	6	63	1,519
Mechanic-welder-oiler-machinist	0	437	0	0	0	5,929
Mine technical support	92	0	1,182	23	0	3,000
Office worker	5	0	2,313	0	0	2,356
Plant operator-warehouseman	57	0	775	54	271	6,742
Shuttle car-tram operator	0	0	60	0	0	394
Stone cutter-finisher	0	0	0	0	0	15
Truck driver	0	0	0	0	0	1,565
Total	609	443	8,150	145	333	33,434

[1]See appendix B for detailed explanation of equipment operated grouping.
[2]As defined by MSHA; see appendix A for detailed explanation of job title grouping.

NOTE—Owing to independent rounding; data may not add to totals shown.

Table E-9.—Nonmetallic mining 1986 workforce estimates: job title, by work location at mine, number of workers

Job title grouping[1]	Underground mine	Surface at underground mine	Surface mine	Plant or mill	Office	Total
Backhoe-crane-dragline-shovel operator	0	18	918	48	0	983
Beltman-belt repairman	20	0	79	47	0	146
Blaster	47	0	30	0	0	77
Deckhand-barge and dredge operator	0	6	62	0	0	68
Dozer-heavy and mobile equipment operator	5	6	1,036	45	0	1,092
Driller-rock bolter	234	6	318	0	0	558
Electrician-lampman	83	31	246	249	0	608
Front-end loader-forklift operator	26	42	509	709	0	1,286
Grader-scraper operator	0	0	361	0	0	361
Laborer-miner-utility man	1,213	304	1,233	1,294	0	4,046
Manager-foreman-supervisor:						
General	247	67	812	930	96	2,152
Maintenance	118	27	213	174	5	537
Working	233	93	384	797	12	1,519
Mechanic-welder-oiler-machinist	845	800	2,298	1,986	0	5,929
Mine technical support	119	187	696	1,404	594	3,000
Office worker	0	0	0	0	2,356	2,356
Plant operator-warehouseman	153	140	552	5,794	104	6,742
Shuttle car-tram operator	247	14	60	73	0	394
Stone cutter-finisher	0	0	0	15	0	15
Truck driver	53	43	1,400	69	0	1,565
Total	3,643	1,783	11,208	13,634	3,167	33,434

[1]As defined by MSHA; see appendix A for detailed explanation of job title grouping.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-10.—Nonmetallic mining 1986 workforce estimates: job title, by years of experience at job

Job title grouping[1]	0< to ≤1	1< to ≤2	2< to ≤3	3< to ≤5	5< to ≤10	10< to ≤20	20<	Unspecified	Total	Median, yr
Backhoe-crane-dragline-shovel operator	78	202	46	95	263	108	35	157	983	5
Beltman-belt repairman	85	0	6	11	14	6	0	24	146	1
Blaster	8	30	11	5	11	13	0	0	77	3
Deckhand-barge and dredge operator	12	38	5	6	6	0	0	0	68	2
Dozer-heavy and mobile equipment operator	93	140	34	94	291	294	44	102	1,092	8
Driller-rock bolter	83	66	50	119	97	103	5	34	558	5
Electrician-lampman	93	64	28	31	227	147	5	13	608	7
Front-end loader-forklift operator	192	218	122	182	253	167	62	91	1,286	4
Grader-scraper operator	28	53	13	68	89	75	5	32	361	6
Laborer-miner-utility man	1,175	493	376	476	950	391	39	147	4,046	3
Manager-foreman-supervisor:										
General	126	215	103	219	532	578	198	181	2,152	8
Maintenance	24	22	68	91	119	150	7	56	537	6
Working	205	153	150	128	373	361	40	110	1,519	6
Mechanic-welder-oiler-machinist	556	563	251	722	2,047	1,194	150	444	5,929	7
Mine technical support	508	369	288	378	667	507	106	177	3,000	5
Office worker	342	297	322	376	532	236	104	149	2,356	4
Plant operator-warehouseman	1,272	839	464	836	1,643	890	68	732	6,742	4
Shuttle car-tram operator	83	15	8	89	140	61	0	0	394	6
Stone cutter-finisher	0	0	0	10	5	0	0	0	15	5
Truck driver	279	203	119	153	470	211	78	53	1,565	6
Total	5,241	3,978	2,464	4,087	8,729	5,489	945	2,502	33,434	5

[1]As defined by MSHA; see appendix A for detailed explanation of job title grouping.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-11.—Nonmetallic mining 1986 workforce estimates: job title, by years of experience at company

Job title grouping[1]	0< to ≤1	1< to ≤5	5< to ≤10	10< to ≤15	15< to ≤20	20< to ≤25	25< to ≤30	30<	Unspecified	Total	Median, yr
Backhoe-crane-dragline-shovel operator	27	203	196	170	114	154	76	43	0	983	13
Beltman-belt repairman	0	25	78	6	32	0	0	6	0	146	7
Blaster	3	14	35	8	13	6	0	0	0	77	8
Deckhand-barge and dredge operator	0	37	25	6	0	0	0	0	0	68	5
Dozer-heavy and mobile equipment operator	39	198	249	382	122	34	19	49	0	1,092	11
Driller-rock bolter	40	150	132	159	72	0	0	5	0	558	8
Electrician-lampman	20	104	153	169	96	24	11	30	0	608	11
Front-end loader-forklift operator	75	274	366	180	184	72	100	36	0	1,286	9
Grader-scraper operator	10	77	105	100	50	19	0	0	0	361	10
Laborer-miner-utility man	652	1,120	1,301	557	207	96	66	32	15	4,046	7
Manager-foreman-supervisor:											
General	71	259	450	332	308	303	87	333	10	2,152	14
Maintenance	14	115	110	70	63	139	17	9	0	537	12
Working	26	180	311	443	212	123	51	174	0	1,519	13
Mechanic-welder-oiler-machinist	355	1,012	1,698	1,526	683	318	188	149	0	5,929	10
Mine technical support	222	814	842	474	184	153	95	210	5	3,000	8
Office worker	165	577	747	489	135	107	59	67	11	2,356	8
Plant operator-warehouseman	520	1,633	2,068	1,182	474	440	168	252	5	6,742	8
Shuttle car-tram operator	56	22	168	101	33	13	0	3	0	394	9
Stone cutter-finisher	0	10	5	0	0	0	0	0	0	15	5
Truck driver	245	359	399	244	126	100	35	57	0	1,565	8
Total	2,540	7,181	9,438	6,597	3,107	2,099	973	1,454	46	33,434	9

[1]As defined by MSHA; see appendix A for detailed explanation of job title grouping.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-12.—Nonmetallic mining 1986 workforce estimates: job title, by years of mining experience

Job title grouping[1]	0< to ≤1	1< to ≤5	5< to ≤10	10< to ≤15	15< to ≤20	20< to ≤25	25< to ≤30	30<	Unspecified	Total	Median, yr
Backhoe-crane-dragline-shovel operator	9	136	194	177	128	126	90	64	60	983	14
Beltman-belt repairman	0	13	90	6	32	0	0	6	0	146	7
Blaster	3	14	35	8	6	13	0	0	0	77	8
Deckhand-barge and dredge operator	0	32	25	6	0	0	0	0	5	68	5
Dozer-heavy and mobile equipment operator	16	125	252	346	115	46	17	49	126	1,092	12
Driller-rock bolter	15	72	182	166	70	7	0	5	40	558	10
Electrician-lampman	8	84	125	175	87	30	11	30	57	608	11
Front-end loader-forklift operator	46	220	317	183	183	38	76	53	170	1,286	10
Grader-scraper operator	5	62	79	76	32	22	0	0	86	361	10
Laborer-miner-utility man	467	907	1,037	483	199	81	54	58	760	4,046	7
Manager-foreman-supervisor:											
General	12	125	253	340	382	262	107	310	361	2,152	18
Maintenance	0	83	69	49	66	103	17	16	134	537	16
Working	13	122	231	375	190	116	45	144	284	1,519	13
Mechanic-welder-oiler-machinist	165	768	1,404	1,455	688	290	185	164	811	5,929	11
Mine technical support	176	627	810	429	172	140	88	202	357	3,000	8
Office worker	139	389	544	447	109	110	45	104	470	2,356	9
Plant operator-warehouseman	314	1,052	1,780	1,078	437	360	143	252	1,326	6,742	9
Shuttle car-tram operator	0	10	198	129	33	18	5	3	0	394	10
Stone cutter-finisher	0	0	0	0	0	0	0	0	15	15	NS
Truck driver	178	236	424	233	124	71	48	68	182	1,565	8
Total	1,565	5,072	8,049	6,160	3,053	1,833	929	1,528	5,245	33,434	10

NS Not significant.
[1]As defined by MSHA; see appendix A for detailed explanation of job title grouping.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-13.—Nonmetallic mining 1986 workforce estimates: job title, by hours of training received in last 2 years

Job title grouping[1]	0	1-8	9-15	16	17-40	41-80	81-160	161+	Unspecified	Total	Mean, hr
Backhoe-crane-dragline-shovel operator	51	22	0	180	61	147	82	28	414	983	60
Beltman-belt repairman	13	0	0	25	0	14	0	0	95	146	21
Blaster	30	0	0	32	10	0	5	0	0	77	20
Deckhand-barge and dredge operator	0	0	0	0	6	44	0	0	18	68	42
Dozer-heavy and mobile equipment operator	68	6	21	326	132	211	35	48	245	1,092	57
Driller-rock bolter	76	10	0	112	114	112	53	11	69	558	53
Electrician-lampman	36	0	5	289	102	51	12	0	112	608	23
Front-end loader-forklift operator	128	39	11	257	426	111	44	23	250	1,286	33
Grader-scraper operator	24	12	5	191	48	14	0	0	69	361	18
Laborer-miner-utility man	235	160	31	1,097	705	355	202	177	1,083	4,046	47
Manager-foreman-supervisor:											
General	217	47	57	387	351	298	56	17	723	2,152	33
Maintenance	14	6	6	106	62	92	35	14	202	537	54
Working	143	54	0	404	387	137	46	19	329	1,519	33
Mechanic-welder-oiler-machinist	216	374	79	1,524	996	754	279	203	1,504	5,929	51
Mine technical support	238	208	13	453	570	185	137	119	1,076	3,000	52
Office worker	356	182	50	303	281	223	30	63	870	2,356	40
Plant operator-warehouseman	440	336	95	1,272	1,402	843	204	219	1,932	6,742	41
Shuttle car-tram operator	120	0	0	58	32	105	15	5	60	394	36
Stone cutter-finisher	0	0	0	0	15	0	0	0	0	15	40
Truck driver	131	90	59	420	267	136	61	49	352	1,565	41
Total	2,534	1,545	431	7,435	5,966	3,831	1,295	994	9,402	33,434	44

[1]As defined by MSHA; see appendix A for detailed explanation of job title grouping.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-14.—Nonmetallic mining 1986 workforce estimates: job title, by years of age

Job title grouping[1]	15-20	21-23	24-26	27-29	30-34	35-39	40-49	50+	Unspecified	Total	Mean, yr
Backhoe-crane-dragline-shovel operator	0	18	108	84	84	175	204	310	0	983	42
Beltman-belt repairman	0	0	13	0	78	19	31	6	0	146	36
Blaster	0	14	8	0	0	6	12	38	0	77	44
Deckhand-barge and dredge operator	0	13	0	6	38	6	0	0	5	68	30
Dozer-heavy and mobile equipment operator	0	15	29	172	162	214	272	228	0	1,092	40
Driller-rock bolter	0	10	23	90	116	130	141	47	0	558	37
Electrician-lampman	0	12	8	28	128	181	99	152	0	608	41
Front-end loader-forklift operator	26	60	110	117	253	142	239	327	12	1,286	40
Grader-scraper operator	0	14	20	33	73	61	84	59	17	361	39
Laborer-miner-utility man	160	269	523	626	788	580	660	435	5	4,046	35
Manager-foreman-supervisor:											
General	0	10	17	90	190	296	748	754	47	2,152	45
Maintenance	0	0	6	0	32	62	256	180	0	537	46
Working	0	0	23	74	232	200	602	388	0	1,519	43
Mechanic-welder-oiler-machinist	5	119	396	626	1,288	1,041	1,208	1,240	7	5,929	39
Mine technical support	36	141	267	224	575	461	567	722	5	3,000	39
Office worker	19	29	99	323	438	473	514	456	5	2,356	39
Plant operator-warehouseman	112	383	719	810	1,038	1,031	1,342	1,293	14	6,742	38
Shuttle car-tram operator	0	0	20	12	107	109	76	66	5	394	39
Stone cutter-finisher	0	5	5	5	0	0	0	0	0	15	25
Truck driver	15	80	106	139	242	166	385	386	45	1,565	40
Total	373	1,190	2,499	3,460	5,862	5,354	7,441	7,088	167	33,434	39

[1]As defined by MSHA; see appendix A for detailed explanation of job title grouping.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-15.—Nonmetallic mining 1986 workforce estimates: job title, by sex

Job title grouping[1]	Male		Female		Unspecified		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct
Backhoe-crane-dragline-shovel operator	983	3	0	0	0	0	983	3
Beltman-belt repairman	146	0	0	0	0	0	146	0
Blaster	77	0	0	0	0	0	77	0
Deckhand-barge and dredge operator	68	0	0	0	0	0	68	0
Dozer-heavy and mobile equipment operator	1,075	3	0	0	17	11	1,092	3
Driller-rock bolter	552	2	6	0	0	0	558	2
Electrician-lampman	608	2	0	0	0	0	608	2
Front-end loader-forklift operator	1,247	4	40	2	0	0	1,286	4
Grader-scraper operator	355	1	0	0	6	4	361	1
Laborer-miner-utility man	3,848	12	181	8	17	11	4,046	12
Manager-foreman-supervisor								
General	2,125	7	0	0	28	18	2,152	6
Maintenance	537	2	0	0	0	0	537	2
Working	1,501	5	7	0	12	7	1,519	5
Mechanic-welder-oiler-machinist	5,855	19	62	3	12	7	5,929	18
Mine technical support	2,710	9	290	13	0	0	3,000	9
Office worker	1,093	4	1,250	54	14	9	2,356	7
Plant operator-warehouseman	6,309	20	408	18	25	16	6,742	20
Shuttle car-tram operator	343	1	46	2	5	3	394	1
Stone cutter-finisher	15	0	0	0	0	0	15	0
Truck driver	1,519	5	22	1	23	15	1,565	5
Total	30,966	100	2,311	100	157	100	33,434	100

[1]As defined by MSHA; see appendix A for detailed explanation of job title grouping.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-16.—Nonmetallic mining 1986 workforce estimates: job title, by race

Job title grouping[1]	White		Black		Hispanic		Other		Unspecified		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct
Backhoe-crane-dragline-shovel operator	776	3	124	3	65	3	19	4	0	0	983	3
Beltman-belt repairman	63	0	83	2	0	0	0	0	0	0	146	0
Blaster	41	0	6	0	30	1	0	0	0	0	77	0
Deckhand-barge and dredge operator	56	0	12	0	0	0	0	0	0	0	68	0
Dozer-heavy and mobile equipment operator	838	3	175	4	55	2	18	4	6	3	1,092	3
Driller-rock bolter	428	2	70	1	60	2	0	0	0	0	558	2
Electrician-lampman	537	2	34	1	37	2	0	0	0	0	608	2
Front-end loader-forklift operator	822	3	271	6	187	8	6	1	0	0	1,286	4
Grader-scraper operator	274	1	41	1	34	1	13	3	0	0	361	1
Laborer-miner-utility man	2,772	11	691	14	450	18	106	24	27	16	4,046	12
Manager-foreman-supervisor:												
General	1,862	7	208	4	46	2	21	5	16	9	2,152	6
Maintenance	504	2	12	0	14	1	6	1	0	0	537	2
Working	1,186	5	155	3	164	7	14	3	0	0	1,519	5
Mechanic-welder-oiler- machinist	4,799	19	700	14	353	14	43	10	33	19	5,929	18
Mine technical support	2,464	10	349	7	125	5	50	11	12	7	3,000	9
Office worker	2,148	8	95	2	49	2	43	10	21	12	2,356	7
Plant operator-warehouseman	4,450	17	1,554	32	674	27	50	11	14	8	6,742	20
Shuttle car-tram operator	259	1	80	2	51	2	0	0	5	3	394	1
Stone cutter-finisher	0	0	0	0	15	1	0	0	0	0	15	0
Truck driver	1,196	5	195	4	80	3	53	12	41	23	1,565	5
Total	25,475	100	4,854	100	2,488	100	442	100	175	100	33,434	100

[1]As defined by MSHA; see appendix A for detailed explanation of job title grouping.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-17.—Nonmetallic mining 1986 workforce estimates: job title, by education

Job title grouping[1]	Some elementary		Some high school		High school diploma		Vocational diploma		Some college		College degree		Unspecified		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct
Backhoe-crane-dragline-shovel operator	35	4	360	37	489	50	42	4	28	3	0	0	30	3	983	3
Beltman-belt repairman	11	8	60	41	75	51	0	0	0	0	0	0	0	0	146	0
Blaster	30	39	12	15	30	39	5	6	0	0	0	0	0	0	77	0
Deckhand-barge and dredge operator	0	0	5	7	63	93	0	0	0	0	0	0	0	0	68	0
Dozer-heavy and mobile equipment operator	77	7	187	17	582	53	85	8	119	11	0	0	41	4	1,092	3
Driller-rock bolter	35	6	194	35	239	43	46	8	30	5	14	3	0	0	558	2
Electrician-lampman	6	1	30	5	261	43	194	32	96	16	6	1	15	2	608	2
Front-end loader-forklift operator	154	12	305	24	505	39	73	6	50	4	13	1	186	14	1,286	4
Grader-scraper operator	30	8	56	16	206	57	9	2	14	4	0	0	48	13	361	1
Laborer-miner-utility man	347	9	751	19	2,006	50	134	3	288	7	36	1	485	12	4,046	12
Manager-foreman-supervisor:																
General	60	3	185	9	980	46	163	8	235	11	443	21	86	4	2,152	6
Maintenance	12	2	30	6	282	53	89	17	32	6	25	5	68	13	537	2
Working	71	5	263	17	730	48	115	8	135	9	75	5	130	9	1,519	5
Mechanic-welder-oiler-machinist	263	4	879	15	3,026	51	847	14	371	6	89	2	453	8	5,929	18
Mine technical support	160	5	302	10	863	29	163	5	554	18	835	28	123	4	3,000	9
Office worker	0	0	52	2	789	33	164	7	492	21	775	33	85	4	2,356	7
Plant operator-warehouseman	647	10	1,096	16	3,325	49	536	8	413	6	61	1	665	10	6,742	20
Shuttle car-tram operator	14	3	121	31	172	44	22	6	66	17	0	0	0	0	394	1
Stone cutter-finisher	15	100	0	0	0	0	0	0	0	0	0	0	0	0	15	0
Truck driver	202	13	320	20	818	52	42	3	67	4	0	0	116	7	1,565	5
Total	2,168	6	5,208	16	15,441	46	2,727	8	2,989	9	2,371	7	2,530	8	33,434	100

[1]As defined by MSHA; see appendix A for detailed explanation of job title grouping.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-18.—Nonmetallic mining 1986 workforce estimates:[1] principal equipment operated, by years of experience at job

Equipment operated grouping[2]	0< to ≤1	1< to ≤2	2< to ≤3	3< to ≤5	5< to ≤10	10< to ≤20	20<	Unspecified	Total	Median, yr
Backhoe-crane-dragline-shovel	93	147	46	100	214	108	35	145	887	5
Belt	90	0	6	11	14	11	0	24	157	1
Dozer-heavy and mobile equipment	132	176	40	120	289	241	39	67	1,102	7
Drill (underground)-rock bolter	38	36	51	86	53	12	0	0	275	4
Drill (surface)	45	25	11	40	62	109	5	16	313	8
Explosives	8	30	11	5	11	13	0	0	77	3
Front-end loader-forklift	346	293	173	250	411	236	73	133	1,915	4
Grader-scraper	55	66	26	91	115	111	10	32	506	5
Handtools (powered and nonpowered)	704	671	299	780	2,228	1,265	150	466	6,564	7
Hoist-elevator	11	0	14	25	59	74	15	5	203	9
Many equipment	52	59	82	123	324	185	11	6	840	7
Miscellaneous utility equipment	623	293	174	203	392	93	16	122	1,915	2
Plant equipment	964	737	387	634	1,224	659	82	618	5,304	4
Pump	13	32	0	41	69	24	0	0	179	6
Scale-lab equipment-controls	270	195	193	166	229	252	63	139	1,506	4
Shuttle car-locomotive	106	34	8	45	135	56	6	0	389	6
Stone cutting-finishing machine	0	0	0	10	5	0	0	0	15	5
Truck (haulage)	279	203	119	158	470	211	78	53	1,570	6
Truck (utility)-personnel carrier	111	65	85	40	183	34	67	19	604	5
Welding machine-lathe	55	6	12	38	113	172	31	16	443	10
None	729	587	341	729	1,506	1,341	147	457	5,837	6
Not elsewhere classified	26	15	21	17	29	12	0	25	145	3
Unspecified	151	13	44	0	64	35	14	13	333	2
Total	4,900	3,681	2,142	3,711	8,197	5,253	841	2,353	31,078	5

[1]Excluding job title category of office workers.
[2]See appendix B for detailed explanation of equipment operated grouping.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-19.—Nonmetallic mining 1986 workforce estimates:[1] principal equipment operated, by hours of training received in last 2 years

Equipment operated grouping[2]	0	1-8	9-15	16	17-40	41-80	81-160	161+	Unspecified	Total	Mean, h
Backhoe-crane-dragline-shovel	51	22	0	150	75	127	88	28	346	887	62
Belt	13	5	0	31	0	14	0	0	95	157	19
Dozer-heavy and mobile equipment	57	13	21	303	122	152	34	86	316	1,102	82
Drill (underground)-rock bolter	60	0	0	76	57	30	33	5	14	275	50
Drill (surface)	16	10	0	71	70	88	14	6	38	313	47
Explosives	30	0	0	32	10	0	5	0	0	77	20
Front-end loader-forklift	222	89	22	387	574	150	65	54	353	1,915	36
Grader-scraper	29	12	5	234	58	66	0	0	102	506	22
Handtools (powered and nonpowered)	285	369	79	1,850	1,162	756	241	190	1,631	6,564	45
Hoist-elevator	60	0	0	84	17	0	33	5	5	203	31
Many equipment	0	0	0	294	135	60	0	5	346	840	29
Miscellaneous utility equipment	64	119	14	366	357	225	115	88	566	1,915	49
Plant equipment	243	278	72	1,020	1,166	757	164	181	1,423	5,304	45
Pump	0	0	0	71	61	26	14	0	6	179	31
Scale-lab equipment-controls	85	149	14	249	304	101	20	61	524	1,506	51
Shuttle car-locomotive	60	0	0	116	32	135	15	5	26	389	40
Stone cutting-finishing machine	0	0	0	0	15	0	0	0	0	15	40
Truck (haulage)	131	90	59	420	267	136	61	49	357	1,570	41
Truck (utility)-personnel carrier	60	18	5	132	64	70	33	0	222	604	33
Welding machine-lathe	17	5	6	85	75	90	78	0	87	443	48
None	653	180	79	1,095	965	542	237	135	1,950	5,837	38
Not elsewhere classified	0	6	6	39	27	32	0	0	34	145	30
Unspecified	42	0	0	28	73	53	14	32	92	333	68
Total	2,178	1,363	381	7,132	5,685	3,609	1,265	931	8,532	31,078	44

[1]Excluding job title category of office workers.
[2]See appendix B for detailed explanation of equipment operated grouping.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-20.—Nonmetallic mining 1986 workforce estimates:[1] principal equipment operated, by years of age

Equipment operated grouping[2]	15-20	21-23	24-26	27-29	30-34	35-39	40-49	50+	Unspecified	Total	Mean, yr
Backhoe-crane-dragline-shovel	0	18	53	78	90	160	209	278	0	887	42
Belt	0	0	13	5	78	19	31	11	0	157	37
Dozer-heavy and mobile equipment	0	34	91	209	144	199	218	202	5	1,102	39
Drill (underground)-rock bolter	0	0	11	52	79	92	30	12	0	275	35
Drill (surface)	0	10	5	45	45	44	106	59	0	313	41
Explosives	0	14	8	0	0	6	12	38	0	77	44
Front-end loader-forklift	31	82	159	235	340	216	365	480	7	1,915	39
Grader-scraper	0	15	20	46	106	74	141	87	17	506	40
Handtools (powered and nonpowered)	5	114	439	692	1,387	1,250	1,269	1,402	7	6,564	39
Hoist-elevator	0	0	3	5	41	34	55	66	0	203	44
Many equipment	0	35	135	56	222	168	164	61	0	840	35
Miscellaneous utility equipment	153	76	225	294	377	254	301	235	0	1,915	35
Plant equipment	98	329	584	704	802	813	1,023	934	19	5,304	37
Pump	0	6	54	57	25	12	24	0	0	179	30
Scale-lab equipment-controls	16	135	114	134	232	298	331	246	0	1,506	37
Shuttle car-locomotive	0	14	34	12	96	15	94	120	5	389	41
Stone cutting-finishing machine	0	5	5	5	0	0	0	0	0	15	25
Truck (haulage)	15	80	106	139	242	166	385	386	50	1,570	40
Truck (utility)-personnel carrier	0	12	23	102	99	68	132	168	0	604	40
Welding machine-lathe	0	20	34	21	94	63	90	122	0	443	40
None	29	143	239	240	794	909	1,878	1,554	52	5,837	42
Not elsewhere classified	6	6	20	0	42	9	26	35	0	145	39
Unspecified	0	16	25	7	90	14	45	137	0	333	43
Total	353	1,162	2,400	3,137	5,424	4,881	6,926	6,632	162	31,078	39

[1]Excluding job title category of office workers.
[2]See appendix B for detailed explanation of equipment operated grouping.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-21.—Nonmetallic mining 1986 workforce estimates:[1] principal equipment operated, by sex

Equipment operated grouping[2]	Male		Female		Unspecified		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct
Backhoe-crane-dragline-shovel	887	3	0	0	0	0	887	3
Belt	157	1	0	0	0	0	157	1
Dozer-heavy and mobile equipment	1,092	4	0	0	11	8	1,102	4
Drill (underground)-rock bolter	269	1	6	1	0	0	275	1
Drill (surface)	313	1	0	0	0	0	313	1
Explosives	77	0	0	0	0	0	77	0
Front-end loader-forklift	1,846	6	63	6	6	4	1,915	6
Grader-scraper	499	2	0	0	7	5	506	2
Handtools (powered and nonpowered)	6,487	22	65	6	12	8	6,564	21
Hoist-elevator	169	1	34	3	0	0	203	1
Many equipment	805	3	30	3	5	3	840	3
Miscellaneous utility equipment	1,771	6	139	13	5	3	1,915	6
Plant equipment	5,010	17	257	24	37	25	5,304	17
Pump	179	1	0	0	0	0	179	1
Scale-lab equipment-controls	1,364	5	142	13	0	0	1,506	5
Shuttle car-locomotive	372	1	12	1	5	3	389	1
Stone cutting-finishing machine	15	0	0	0	0	0	15	0
Truck (haulage)	1,524	5	22	2	23	16	1,570	5
Truck (utility)-personnel carrier	561	2	37	4	6	4	604	2
Welding machine-lathe	443	1	0	0	0	0	443	1
None	5,568	19	241	23	28	19	5,837	19
Not elsewhere classified	145	0	0	0	0	0	145	0
Unspecified	321	1	13	1	0	0	333	1
Total	29,873	100	1,061	100	143	100	31,078	100

[1]Excluding job title category of office workers.
[2]See appendix B for detailed explanation of equipment operated grouping.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-22.—Nonmetallic mining 1986 workforce estimates:[1] principal equipment operated, by race

Equipment operated grouping[2]	White		Black		Hispanic		Other		Unspecified		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct
Backhoe-crane-dragline-shovel	771	3	71	1	20	1	25	6	0	0	887	3
Belt	74	0	83	2	0	0	0	0	0	0	157	1
Dozer-heavy and mobile equipment	819	4	160	3	107	4	11	3	6	4	1,102	4
Drill (underground)-rock bolter	205	1	40	1	30	1	0	0	0	0	275	1
Drill (surface)	248	1	36	1	30	1	0	0	0	0	313	1
Explosives	41	0	6	0	30	1	0	0	0	0	77	0
Front-end loader-forklift	1,304	6	364	8	230	9	6	2	10	6	1,915	6
Grader-scraper	385	2	74	2	35	1	13	3	0	0	506	2
Handtools (powered and nonpowered)	5,336	23	764	16	380	16	51	13	33	21	6,564	21
Hoist-elevator	110	0	88	2	5	0	0	0	0	0	203	1
Many equipment	578	2	57	1	199	8	0	0	6	4	840	3
Miscellaneous utility equipment	1,230	5	396	8	192	8	92	23	5	3	1,915	6
Plant equipment	3,371	14	1,280	27	609	25	38	9	6	4	5,304	17
Pump	122	1	57	1	0	0	0	0	0	0	179	1
Scale-lab equipment-controls	1,219	5	179	4	80	3	28	7	0	0	1,506	5
Shuttle car-locomotive	293	1	29	1	56	2	6	1	5	3	389	1
Stone cutting-finishing machine	0	0	0	0	15	1	0	0	0	0	15	0
Truck (haulage)	1,201	5	195	4	80	3	53	13	41	27	1,570	5
Truck (utility)-personnel carrier	509	2	64	1	25	1	0	0	6	4	604	2
Welding machine-lathe	327	1	72	2	44	2	0	0	0	0	443	1
None	4,905	21	623	13	206	8	75	19	28	18	5,837	19
Not elsewhere classified	49	0	69	1	27	1	0	0	0	0	145	0
Unspecified	231	1	54	1	40	2	0	0	9	6	333	1
Total	23,327	100	4,758	100	2,439	100	399	100	154	100	31,078	100

[1]Excluding job title category of office workers.
[2]See appendix B for detailed explanation of equipment operated grouping.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-23.—Nonmetallic mining 1986 workforce estimates:[1] principal equipment operated, by education

Equipment operated grouping[2]	Some elementary		Some high school		High school diploma		Vocational diploma		Some college		College degree		Unspecified		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct
Backhoe-crane-dragline-shovel	35	4	332	37	429	48	27	3	34	4	0	0	30	3	887	3
Belt	11	7	60	38	86	55	0	0	0	0	0	0	0	0	157	1
Dozer-heavy and mobile equipment	84	8	118	11	686	62	74	7	115	10	9	1	17	2	1,102	4
Drill (underground)-rock bolter	0	0	95	35	90	33	41	15	34	12	14	5	0	0	275	1
Drill (surface)	47	15	99	32	149	47	5	2	14	4	0	0	0	0	313	1
Explosives	30	39	12	15	30	39	5	6	0	0	0	0	0	0	77	0
Front-end loader-forklift	236	12	439	23	755	39	127	7	95	5	13	1	249	13	1,915	6
Grader-scraper	50	10	81	16	300	59	9	2	20	4	0	0	48	9	506	2
Handtools (powered and nonpowered)	280	4	926	14	3,277	50	1,050	16	462	7	102	2	467	7	6,564	21
Hoist-elevator	47	23	74	37	68	34	5	2	0	0	0	0	8	4	203	1
Many equipment	36	4	99	12	312	37	73	9	0	0	11	1	309	37	840	3
Miscellaneous utility equipment	137	7	423	22	995	52	33	2	173	9	16	1	138	7	1,915	6
Plant equipment	413	8	861	16	2,824	53	359	7	330	6	43	1	475	9	5,304	17
Pump	0	0	45	25	111	62	15	8	0	0	0	0	8	4	179	1
Scale-lab equipment-controls	25	2	205	14	549	36	133	9	293	19	224	15	77	5	1,506	5
Shuttle car-locomotive	17	4	112	29	166	43	22	6	72	18	0	0	0	0	389	1
Stone cutting-finishing machine	15	100	0	0	0	0	0	0	0	0	0	0	0	0	15	0
Truck (haulage)	202	13	325	21	818	52	42	3	67	4	0	0	116	7	1,570	5
Truck (utility)-personnel carrier	9	1	104	17	291	48	35	6	119	20	34	6	12	2	604	2
Welding machine-lathe	18	4	47	11	294	66	37	8	31	7	0	0	16	4	443	1
None	311	5	641	11	2,239	38	453	8	633	11	1,131	19	429	7	5,837	19
Not elsewhere classified	50	34	21	14	57	40	0	0	0	0	0	0	17	12	145	0
Unspecified	117	35	36	11	125	38	20	6	6	2	0	0	30	9	333	1
Total	2,168	7	5,155	17	14,652	47	2,563	8	2,497	8	1,596	5	2,445	8	31,078	100

[1]Excluding job title category of office workers.
[2]See appendix B for detailed explanation of equipment operated grouping.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-24.—Nonmetallic mining 1986 workforce estimates: job, company, and mining experience, by work location

Experience, yr	Underground mine		Surface at underground mine		Surface mine		Plant or mill		Office		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct
At present job:												
0< to ≤1	556	15	139	8	1,779	16	2,325	17	442	14	5,241	16
1< to ≤2	352	10	202	11	1,410	13	1,635	12	379	12	3,978	12
2< to ≤3	207	6	168	9	760	7	930	7	398	13	2,464	7
3< to ≤5	568	16	273	15	1,108	10	1,622	12	515	16	4,087	12
5< to ≤10	1,311	36	548	31	2,845	25	3,278	24	747	24	8,729	26
10< to ≤20	605	17	366	21	2,122	19	2,009	15	387	12	5,489	16
20<	33	1	81	5	359	3	344	3	128	4	945	3
Unspecified	12	0	5	0	823	7	1,489	11	172	5	2,502	7
Total	3,643	100	1,783	100	11,208	100	13,634	100	3,167	100	33,434	100
Median, yr	6	NAp	7	NAp	6	NAp	5	NAp	5	NAp	5	NAp
At present company:												
0< to ≤1	308	8	107	6	807	7	1,062	8	256	8	2,540	8
1< to ≤5	705	19	245	14	2,410	22	2,988	22	833	26	7,181	21
5< to ≤10	1,201	33	438	25	2,927	26	3,972	29	901	28	9,438	28
10< to ≤15	650	18	423	24	2,577	23	2,346	17	601	19	6,597	20
15< to ≤20	427	12	78	4	993	9	1,432	11	177	6	3,107	9
20< to ≤25	197	5	182	10	733	7	843	6	143	5	2,099	6
25< to ≤30	51	1	35	2	310	3	491	4	86	3	973	3
30<	105	3	274	15	431	4	485	4	160	5	1,454	4
Unspecified	0	0	0	0	20	0	15	0	11	0	46	0
Total	3,643	100	1,783	100	11,208	100	13,634	100	3,167	100	33,434	100
Median, yr	9	NAp	11	NAp	9	NAp	8	NAp	8	NAp	9	NAp
Total mining:												
0< to ≤1	41	1	14	1	550	5	770	6	191	6	1,565	5
1< to ≤5	515	14	150	8	1,690	15	2,115	16	602	19	5,072	15
5< to ≤10	1,036	28	158	9	2,699	24	3,477	26	679	21	8,049	24
10< to ≤15	616	17	350	20	2,499	22	2,107	15	587	19	6,160	18
15< to ≤20	454	12	165	9	1,032	9	1,243	9	160	5	3,053	9
20< to ≤25	132	4	189	11	649	6	708	5	154	5	1,833	5
25< to ≤30	60	2	40	2	298	3	475	3	56	2	929	3
30<	115	3	276	15	507	5	445	3	185	6	1,528	5
Unspecified	673	18	440	25	1,284	11	2,293	17	554	18	5,245	16
Total	3,643	100	1,783	100	11,208	100	13,634	100	3,167	100	33,434	100
Median, yr	10	NAp	15	NAp	11	NAp	9	NAp	9	NAp	10	NAp

NAp Not applicable.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-25.—Nonmetallic mining 1986 workforce estimates: training received, by work location

Job training for last 2 yr, h	Underground mine		Surface at underground mine		Surface mine		Plant or mill		Office		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct
0	450	12	44	2	592	5	957	7	490	15	2,534	8
1-8	25	1	284	16	383	3	617	5	236	7	1,545	5
9-15	20	1	0	0	148	1	191	1	72	2	431	1
16	998	27	409	23	2,706	24	2,920	21	402	13	7,435	22
17-40	578	16	191	11	1,457	13	3,300	24	440	14	5,966	18
41-80	614	17	160	9	1,471	13	1,304	10	282	9	3,831	11
81-160	177	5	192	11	403	4	431	3	93	3	1,295	4
161+	27	1	49	3	489	4	361	3	69	2	994	3
Unspecified	754	21	454	25	3,557	32	3,554	26	1,083	34	9,402	28
Total	3,643	100	1,783	100	11,208	100	13,634	100	3,167	100	33,434	100
Mean training, h	35	NAp	42	NAp	55	NAp	39	NAp	38	NAp	44	NAp

NAp Not applicable.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-26.—Nonmetallic mining 1986 workforce estimates: age distribution, by work location

Age, yr	Underground mine		Surface at underground mine		Surface mine		Plant or mill		Office		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct
15-20	19	1	0	0	53	0	271	2	29	1	373	1
21-23	83	2	6	0	480	4	573	4	48	2	1,190	4
24-26	297	8	106	6	750	7	1,194	9	152	5	2,499	7
27-29	330	9	216	12	1,135	10	1,424	10	354	11	3,460	10
30-34	708	19	311	17	2,070	18	2,234	16	539	17	5,862	18
35-39	757	21	173	10	1,727	15	2,034	15	663	21	5,354	16
40-49	830	23	354	20	2,486	22	3,129	23	641	20	7,441	22
50+	614	17	616	35	2,381	21	2,742	20	735	23	7,088	21
Unspecified	5	0	0	0	124	1	32	0	5	0	167	0
Total	3,643	100	1,783	100	11,208	100	13,634	100	3,167	100	33,434	100
Mean age, yr	38	NAp	42	NAp	39	NAp	39	NAp	40	NAp	39	NAp

NAp Not applicable.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-27.—Nonmetallic mining 1986 workforce estimates: sex, race, and education, by work location

	Underground mine		Surface at underground mine		Surface mine		Plant or mill		Office		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct
Sex:												
Male	3,503	96	1,743	98	10,922	97	13,045	96	1,753	55	30,966	93
Female	119	3	40	2	237	2	514	4	1,401	44	2,311	7
Unspecified	21	1	0	0	48	0	75	1	14	0	157	0
Total	3,643	100	1,783	100	11,208	100	13,634	100	3,167	100	33,434	100
Race:												
White	2,893	79	1,467	82	8,630	77	9,636	71	2,849	90	25,475	76
Black	230	6	203	11	1,463	13	2,843	21	114	4	4,854	15
Hispanic	436	12	79	4	852	8	1,016	7	105	3	2,488	7
Other	48	1	14	1	193	2	122	1	66	2	442	1
Unspecified	36	1	19	1	70	1	17	0	33	1	175	1
Total	3,643	100	1,783	100	11,208	100	13,634	100	3,167	100	33,434	100
Education level:												
Some elementary	175	5	88	5	817	7	1,082	8	7	0	2,168	6
Some high school	614	17	180	10	2,088	19	2,253	17	72	2	5,208	16
High school diploma	1,617	44	781	44	5,845	52	6,278	46	921	29	15,441	46
Vocational diploma	437	12	207	12	702	6	1,181	9	199	6	2,727	8
Some college	225	6	137	8	733	7	1,184	9	711	22	2,989	9
College degree	134	4	85	5	371	3	624	5	1,158	37	2,371	7
Unspecified	442	12	305	17	652	6	1,032	8	99	3	2,530	8
Total	3,643	100	1,783	100	11,208	100	13,634	100	3,167	100	33,434	100

NOTE—Owing to independent rounding, data may not equal to totals shown.

Table E-28.—Nonmetallic mining 1986 workforce estimates:[1] experience at job, by hours of training received in last 2 years

Experience at present job, yr	0	1-8	9-15	16	17-40	41-80	81-160	161+	Unspecified	Total	Mean, h
0< to ≤1:											
Workers	369	298	69	703	1,158	576	221	355	1,149	4,900	62
pct	8	6	1	14	24	12	5	7	23	100	NAp
1< to ≤2:											
Workers	185	56	48	664	1,183	489	185	213	658	3,681	56
pct	5	2	1	18	32	13	5	6	18	100	NAp
2< to ≤3:											
Workers	160	64	24	505	452	245	200	37	455	2,142	43
pct	7	3	1	24	21	11	9	2	21	100	NAp
3< to ≤5:											
Workers	334	213	42	839	778	400	210	126	768	3,711	51
pct	9	6	1	23	21	11	6	3	21	100	NAp
5< to ≤10:											
Workers	655	297	76	2,725	1,240	1,057	256	126	1,766	8,197	32
pct	8	4	1	33	15	13	3	2	22	100	NAp
10< to ≤20:											
Workers	384	153	76	1,486	626	742	183	39	1,563	5,253	34
pct	7	3	1	28	12	14	3	1	30	100	NAp
20<:											
Workers	75	59	22	204	159	99	5	10	208	841	31
pct	9	7	3	24	19	12	1	1	25	100	NAp
Unspecified:											
Workers	17	222	25	6	88	0	5	25	1,964	2,353	53
pct	1	9	1	0	4	0	0	1	83	100	NAp
Total:											
Workers	2,178	1,363	381	7,132	5,685	3,609	1,265	931	8,532	31,078	44
pct	7	4	1	23	18	12	4	3	27	100	NAp

NAp Not applicable.
[1]Excluding job title category of office workers.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-29.—Nonmetallic mining 1986 workforce estimates:[1] experience at job, by years of age

Experience at present job, yr	15-20	21-23	24-26	27-29	30-34	35-39	40-49	50+	Unspecified	Total	Mean, yr
0< to ≤1:											
Workers	172	578	781	770	1,020	598	641	314	26	4,900	32
pct	4	12	16	16	21	12	13	6	1	100	NAp
1< to ≤2:											
Workers	46	196	495	540	804	488	715	390	8	3,681	35
pct	1	5	13	15	22	13	19	11	0	100	NAp
2< to ≤3:											
Workers	30	196	239	274	349	277	426	331	20	2,142	36
pct	1	9	11	13	16	13	20	15	1	100	NAp
3< to ≤5:											
Workers	65	109	319	437	780	725	615	638	23	3,711	38
pct	2	3	9	12	21	20	17	17	1	100	NAp
5< to ≤10:											
Workers	0	19	433	884	1,609	1,641	1,776	1,787	49	8,197	40
pct	0	0	5	11	20	20	22	22	1	100	NAp
10< to ≤20:											
Workers	0	0	0	27	527	844	1,949	1,892	14	5,253	46
pct	0	0	0	1	10	16	37	36	0	100	NAp
20<:											
Workers	0	0	0	0	0	7	135	687	12	841	55
pct	0	0	0	0	0	1	16	82	1	100	NAp
Unspecified:											
Workers	40	64	133	207	337	301	668	592	10	2,353	41
pct	2	3	6	9	14	13	28	25	0	100	NAp
Total:											
Workers	353	1,162	2,400	3,137	5,424	4,881	6,926	6,632	162	31,078	39
pct	1	4	8	10	17	16	22	21	1	100	NAp

NAp Not applicable.
[1]Excluding job title category of office workers.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-30.—Nonmetallic mining 1986 workforce estimates:[1] experience at job, by sex

Experience at present job, yr	Male		Female		Unspecified		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct
0< to ≤1	4,638	16	243	23	18	13	4,900	16
1< to ≤2	3,529	12	142	13	10	7	3,681	12
2< to ≤3	2,021	7	110	10	10	7	2,142	7
3< to ≤5	3,597	12	104	10	10	7	3,711	12
5< to ≤10	7,911	26	282	27	5	3	8,197	26
10< to ≤20	5,114	17	114	11	26	18	5,253	17
20<	841	3	0	0	0	0	841	3
Unspecified	2,223	7	66	6	64	45	2,353	8
Total	29,873	100	1,061	100	143	100	31,078	100
Median, yr	6	NAp	4	NAp	5	NAp	5	NAp

NAp Not applicable.
[1]Excluding job title category of office workers.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-31.—Nonmetallic mining 1986 workforce estimates:[1] experience at job, by race

Experience at present job, yr	White		Black		Hispanic		Other		Unspecified		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct
0< to ≤1	3,690	16	624	13	453	19	103	26	29	19	4,900	16
1< to ≤2	2,674	11	494	10	408	17	75	19	31	20	3,681	12
2< to ≤3	1,718	7	295	6	102	4	27	7	0	0	2,142	7
3< to ≤5	2,888	12	453	10	283	12	78	19	9	6	3,711	12
5< to ≤10	6,108	26	1,159	24	804	33	57	14	69	45	8,197	26
10< to ≤20	3,810	16	1,111	23	269	11	47	12	16	10	5,253	17
20<	689	3	90	2	55	2	7	2	0	0	841	3
Unspecified	1,750	8	532	11	66	3	6	1	0	0	2,353	8
Total	23,327	100	4,758	100	2,439	100	399	100	154	100	31,078	100
Median, yr	5	NAp	6	NAp	5	NAp	3	NAp	6	NAp	5	NAp

NAp Not applicable.
[1]Excluding job title category of office workers.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-32.—Nonmetallic mining 1986 workforce estimates:[1] experience at job, by education

Experience at present job, yr	Some elementary		Some high school		High school diploma		Vocational diploma		Some college		College degree		Unspecified		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct
0< to ≤1	184	8	763	15	2,453	17	366	14	609	24	252	16	271	11	4,900	16
1< to ≤2	161	7	725	14	1,535	10	224	9	427	17	209	13	401	16	3,681	12
2< to ≤3	150	7	384	7	1,110	8	130	5	157	6	115	7	97	4	2,142	7
3< to ≤5	291	13	532	10	1,625	11	409	16	270	11	251	16	334	14	3,711	12
5< to ≤10	613	28	1,235	24	3,833	26	731	29	624	25	482	30	679	28	8,197	26
10< to ≤20	476	22	923	18	2,765	19	400	16	219	9	175	11	297	12	5,253	17
20<	111	5	130	3	428	3	50	2	65	3	35	2	23	1	841	3
Unspecified	184	8	462	9	903	6	255	10	127	5	78	5	344	14	2,353	8
Total	2,168	100	5,155	100	14,652	100	2,563	100	2,497	100	1,596	100	2,445	100	31,078	100
Median, yr	7	NAp	5	NAp	6	NAp	6	NAp	3	NAp	5	NAp	5	NAp	5	NAp

NAp Not applicable.
[1]Excluding job title category of office workers.

NOTE—Owing to independent rounding, data may not add to totals shown.

Table E-33.—Nonmetallic mining 1986 workforce estimates:[1] experience at company, by hours of training received in last 2 years

Experience at present company, yr	0	1-8	9-15	16	17-40	41-80	81-160	161+	Unspecified	Total	Mean, h
0< to ≤1:											
Workers	132	188	91	213	443	520	64	159	566	2,375	63
pct	6	8	4	9	19	22	3	7	24	100	NAp
1< to ≤5:											
Workers	403	218	88	1,172	1,558	781	388	275	1,722	6,604	52
pct	6	3	1	18	24	12	6	4	26	100	NAp
5< to ≤10:											
Workers	638	352	49	2,387	1,568	973	362	319	2,043	8,691	48
pct	7	4	1	27	18	11	4	4	24	100	NAp
10< to ≤15:											
Workers	489	286	27	1,592	841	607	178	97	1,990	6,108	33
pct	8	5	0	26	14	10	3	2	33	100	NAp
15< to ≤20:											
Workers	195	92	73	631	632	418	106	52	773	2,972	40
pct	7	3	2	21	21	14	4	2	26	100	NAp
20< to ≤25:											
Workers	100	137	16	429	221	223	49	10	806	1,992	29
pct	5	7	1	22	11	11	2	1	40	100	NAp
25< to ≤30:											
Workers	28	16	23	279	217	46	33	0	273	914	27
pct	3	2	2	30	24	5	4	0	30	100	NAp
30<:											
Workers	194	75	15	429	206	41	84	19	323	1,387	26
pct	14	5	1	31	15	3	6	1	23	100	NAp
Unspecified:											
Workers	0	0	0	0	0	0	0	0	35	35	NS
pct	0	0	0	0	0	0	0	0	100	100	NAp
Total:											
Workers	2,178	1,363	381	7,132	5,685	3,609	1,265	931	8,532	31,078	44
pct	7	4	1	23	18	12	4	3	27	100	NAp

NAp Not applicable. NS Not significant.
[1]Excluding job title category of office workers.

NOTE —Owing to independent rounding, data may not add to totals shown.

Table E-34.—Nonmetallic mining 1986 workforce estimates:[1] experience at company, by years of age

Experience at present company, yr	15-20	21-23	24-26	27-29	30-34	35-39	40-49	50+	Unspecified	Total	Mean, yr
0< to ≤1:											
Workers	169	426	355	286	298	287	317	217	21	2,375	32
pct	7	18	15	12	13	12	13	9	1	100	NAp
1< to ≤5:											
Workers	179	699	1,284	992	1,320	745	872	474	38	6,604	32
pct	3	11	19	15	20	11	13	7	1	100	NAp
5< to ≤10:											
Workers	0	37	756	1,659	2,225	1,371	1,537	1,085	22	8,691	36
pct	0	0	9	19	26	16	18	12	0	100	NAp
10< to ≤15:											
Workers	0	0	0	201	1,499	1,623	1,613	1,167	5	6,108	41
pct	0	0	0	3	25	27	26	19	0	100	NAp
15< to ≤20:											
Workers	0	0	0	0	82	764	1,282	831	14	2,972	45
pct	0	0	0	0	3	26	43	28	0	100	NAp
20< to ≤25:											
Workers	0	0	0	0	0	92	1,008	874	19	1,992	49
pct	0	0	0	0	0	5	51	44	1	100	NAp
25< to ≤30:											
Workers	0	0	0	0	0	0	293	593	28	914	53
pct	0	0	0	0	0	0	32	65	3	100	NAp
30<:											
Workers	0	0	0	0	0	0	6	1,381	0	1,387	58
pct	0	0	0	0	0	0	0	100	0	100	NAp
Unspecified:											
Workers	5	0	5	0	0	0	0	10	15	35	41
pct	15	0	14	0	0	0	0	28	42	100	NAp
Total:											
Workers	353	1,162	2,400	3,137	5,424	4,881	6,926	6,632	162	31,078	39
pct	1	4	8	10	17	16	22	21	1	100	100

NAp Not applicable.
[1]Excluding job title category of office workers.

NOTE —Owing to independent rounding, data may not add to totals shown.

Table E-35.—Nonmetallic mining 1986 workforce estimates:[1] experience at company, by sex

Experience at present company, yr	Male		Female		Unspecified		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct
0< to ≤1	2,236	7	133	13	6	4	2,375	8
1< to ≤5	6,241	21	312	29	52	36	6,604	21
5< to ≤10	8,332	28	319	30	40	28	8,691	28
10< to ≤15	5,803	19	284	27	21	15	6,108	20
15< to ≤20	2,955	10	0	0	17	12	2,972	10
20< to ≤25	1,984	7	0	0	8	6	1,992	6
25< to ≤30	908	3	6	1	0	0	914	3
30<	1,379	5	8	1	0	0	1,387	4
Unspecified	35	0	0	0	0	0	35	0
Total	29,873	100	1,061	100	143	100	31,078	100
Median, yr	9	NAp	7	NAp	7	NAp	9	NAp

NAp Not applicable.
[1]Excluding job title category of office workers.

NOTE —Owing to independent rounding, data may not add to totals shown.

Table E-36.—Nonmetallic mining 1986 workforce estimates:[1] experience at company, by race

Experience at present company, yr	White		Black		Hispanic		Other		Unspecified		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct
0< to ≤1	1,719	7	266	6	299	12	67	17	24	16	2,375	8
1< to ≤5	5,298	23	572	12	610	25	88	22	36	23	6,604	21
5< to ≤10	6,526	28	1,116	23	884	36	96	24	69	45	8,691	28
10< to ≤15	4,309	18	1,402	29	293	12	93	23	10	6	6,108	20
15< to ≤20	2,184	9	627	13	128	5	21	5	12	8	2,972	10
20 to ≤25	1,464	6	390	8	103	4	32	8	3	2	1,992	6
25 to ≤30	752	3	123	3	40	2	0	0	0	0	914	3
30	1,045	4	264	6	76	3	3	1	0	0	1,387	4
Unspecified	30	0	0	0	5	0	0	0	0	0	35	0
Total	23,327	100	4,758	100	2,439	100	399	100	154	100	31,078	100
Median, yr	9	NAp	12	NAp	7	NAp	8	NAp	7	NAp	9	NAp

NAp Not applicable.
[1]Excluding job title category of office workers.

NOTE —Owing to independent rounding, data may not add to totals shown.

Table E-37.—Nonmetallic mining 1986 workforce estimates:[1] experience at company, by education

Experience at present company, yr	Some elementary		Some high school		High school diploma		Vocational diploma		Some college		College degree		Unspecified		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct
0< to ≤1	40	2	346	7	1,090	7	220	9	308	12	177	11	195	8	2,375	8
1< to ≤5	208	10	1,014	20	3,297	23	576	22	650	26	444	28	414	17	6,604	21
5< to ≤10	478	22	1,379	27	4,004	27	718	28	802	32	576	36	734	30	8,691	28
10< to ≤15	552	25	1,055	20	2,855	19	508	20	398	16	176	11	564	23	6,108	20
15< to ≤20	303	14	531	10	1,512	10	258	10	114	5	45	3	209	9	2,972	10
20< to ≤25	189	9	362	7	981	7	122	5	92	4	37	2	209	9	1,992	6
25< to ≤30	163	7	262	5	269	2	63	2	69	3	25	2	63	3	914	3
30<	231	11	201	4	628	4	98	4	65	3	106	7	58	2	1,387	4
Unspecified	5	0	5	0	15	0	0	0	0	0	10	1	0	0	35	0
Total	2,168	100	5,155	100	14,652	100	2,563	100	2,497	100	1,596	100	2,445	100	31,078	100
Median, yr	14	NAp	10	NAp	9	NAp	9	NAp	7	NAp	6	NAp	9	NAp	9	NAp

NAp Not applicable.
[1]Excluding job title category of office workers.

NOTE —Owing to independent rounding, data may not add to totals shown.

Table E-38.—Nonmetallic mining 1986 workforce estimates:[1] age, by education

Age, yr	Some elementary		Some high school		High school diploma		Vocational diploma		Some college		College degree		Unspecified		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct
15-20	5	1	107	30	158	45	6	2	35	10	0	0	42	12	353	100
21-23	39	3	92	8	732	63	75	6	72	6	25	2	126	11	1,162	100
24-26	16	1	320	13	1,405	59	132	6	227	9	83	3	217	9	2,400	100
27-29	55	2	323	10	1,675	53	391	12	318	10	147	5	228	7	3,137	100
30-34	188	3	806	15	2,596	48	485	9	653	12	333	6	362	7	5,424	100
35-39	149	3	652	13	2,373	49	512	10	472	10	340	7	383	8	4,881	100
40-49	550	8	1,461	21	3,077	44	564	8	348	5	312	5	614	9	6,926	100
50+	1,159	17	1,333	20	2,581	39	386	6	362	5	339	5	473	7	6,632	100
Unspecified	7	4	60	37	56	35	12	7	10	6	17	10	0	0	162	100
Total	2,168	7	5,155	17	14,652	47	2,563	8	2,497	8	1,596	5	2,445	8	31,078	100
Mean age...yr..	48	NAp	41	NAp	38	NAp	38	NAp	36	NAp	40	NAp	39	NAp	39	NAp

NAp Not applicable.
[1]Excluding job title category of office workers.

NOTE —Owing to independent rounding, data may not add to totals shown.

Table E-39.—Nonmetallic mining 1986 workforce estimates:[1] age, race, and education, by sex

	Male		Female		Unspecified		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct
Age, yr:								
15-20	343	1	10	1	0	0	353	1
21-23	1,105	4	38	4	19	13	1,162	4
24-26	2,315	8	68	6	17	12	2,400	8
27-29	2,986	10	138	13	13	9	3,137	10
30-34	5,231	18	178	17	16	11	5,424	17
35-39	4,640	16	236	22	5	3	4,881	16
40-49	6,653	22	219	21	54	38	6,926	22
50+	6,443	22	174	16	15	10	6,632	21
Unspecified	157	1	0	0	5	3	162	1
Total	29,873	100	1,061	100	143	100	31,078	100
Mean age.....yr..	39	NAp	38	NAp	37	NAp	39	NAp
Race:								
White	22,588	76	691	65	48	34	23,327	75
Black	4,421	15	290	27	48	33	4,758	15
Hispanic	2,360	8	62	6	18	12	2,439	8
Other	380	1	19	2	0	0	399	1
Unspecified	125	0	0	0	30	21	154	0
Total	29,873	100	1,061	100	143	100	31,078	100
Education level:								
Some elementary	2,055	7	102	10	11	8	2,168	7
Some high school	4,964	17	170	16	21	15	5,155	17
High school diploma	14,148	47	436	41	68	47	14,652	47
Vocational diploma	2,482	8	69	7	12	8	2,563	8
Some college	2,348	8	139	13	10	7	2,497	8
College degree	1,544	5	47	4	5	3	1,596	5
Unspecified	2,331	8	97	9	17	12	2,445	8
Total	29,873	100	1,061	100	143	100	31,078	100

NAp Not applicable.
[1]Excluding job title category of office workers.

NOTE —Owing to independent rounding, data may not add to totals shown.

Table E-40.—Nonmetallic mining 1986 workforce estimates:[1] age and education, by race

	White		Black		Hispanic		Other		Unspecified		Total	
	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct	Workers	pct
Age, yr:												
15-20	235	1	82	2	16	1	20	5	0	0	353	1
21-23	859	4	107	2	134	5	37	9	25	16	1,162	4
24-26	1,807	8	238	5	288	12	58	14	9	6	2,400	8
27-29	2,510	11	356	7	234	10	25	6	11	7	3,137	10
30-34	3,841	16	1,011	21	446	18	96	24	31	20	5,424	17
35-39	3,718	16	660	14	423	17	63	16	16	10	4,881	16
40-49	5,102	22	1,215	26	504	21	57	14	49	32	6,926	22
50+	5,110	22	1,088	23	384	16	42	11	9	6	6,632	21
Unspecified	145	1	0	0	11	0	0	0	5	3	162	1
Total	23,327	100	4,758	100	2,439	100	399	100	154	100	31,078	100
Mean age, yr	39	NAp	40	NAp	37	NAp	35	NAp	35	NAp	39	NAp
Education level:												
Some elementary	1,057	5	758	16	334	14	13	3	6	4	2,168	7
Some high school	3,276	14	1,321	28	417	17	100	25	41	27	5,155	17
High school diploma	11,652	50	1,730	36	1,070	44	159	40	40	26	14,652	47
Vocational diploma	2,054	9	348	7	145	6	16	4	0	0	2,563	8
Some college	2,082	9	186	4	166	7	53	13	10	6	2,497	8
College degree	1,501	6	8	0	24	1	41	10	22	14	1,596	5
Unspecified	1,704	7	407	9	283	12	16	4	35	23	2,445	8
Total	23,327	100	4,758	100	2,439	100	399	100	154	100	31,078	100

NAp Not applicable.
[1]Excluding job title category of office workers.

NOTE —Owing to independent rounding, data may not add to totals shown.

Table E-41.—Nonmetallic mining 1986 workforce estimates: number of workers and coefficient of variation, by employment size class

Employment size class[1]	Workers	CV, pct
1-19	3,825	5.4
20-49	4,062	8.9
50-99	4,360	7.4
100-249	9,049	7.3
250-499	5,514	6.3
500+	6,625	1.8
All groupings	33,434	2.9

[1]MSHA size groups are based on the annual average employment of the primary subunit and not on the total employment; hence, MSHA published injury statistics by size groups should not be analyzed against these data.

NOTE —Owing to independent rounding, data may not add to totals shown.

Table E-42.—Nonmetallic mining 1986 workforce estimates: number of workers and coefficient of variation, by job title

Job title grouping[1]	Workers	CV, pct
Backhoe-crane-dragline-shovel operator	983	11.4
Beltman-belt repairman	146	52.0
Blaster	77	50.4
Deckhand-barge and dredge operator	68	13.1
Dozer-heavy and mobile equipment operator	1,092	8.6
Driller-rock bolter	558	17.7
Electrician-lampman	608	13.3
Front-end loader-forklift operator	1,286	10.5
Grader-scraper operator	361	27.8
Laborer-miner-utility man	4,046	8.5
Manager-foreman-supervisor:		
General	2,152	5.0
Maintenance	537	12.1
Working	1,519	13.4
Mechanic-welder-oiler-machinist	5,929	5.5
Mine technical support	3,000	11.2
Office worker	2,356	4.1
Plant operator-warehouseman	6,742	4.0
Shuttle car-tram operator	394	22.7
Stone cutter-finisher	15	100.0
Truck driver	1,565	12.0
All groupings	33,434	2.9

[1]As defined by MSHA; see appendix A for detailed explanation of job title grouping.

NOTE —Owing to independent rounding, data may not add to totals shown.

Table E-43.—Nonmetallic mining 1986 workforce estimates:[1] number of workers and coefficient of variation, by principal equipment operated

Equipment operated grouping[2]	Workers	CV, pct
Backhoe-crane-dragline-shovel	887	9.7
Belt	157	47.0
Dozer-heavy and mobile equipment	1,102	14.1
Drill (underground)-rock bolter	275	30.7
Drill (surface)	313	25.3
Explosives	77	50.4
Front-end loader-forklift	1,915	6.1
Grader-scraper	506	17.9
Handtools (powered and nonpowered)	6,564	7.3
Hoist-elevator	203	43.6
Many equipment	840	9.4
Miscellaneous utility equipment	1,915	10.8
Plant equipment	5,304	4.0
Pump	179	37.4
Scale-lab equipment-controls	1,506	7.0
Shuttle car-locomotive	389	13.6
Stone cutting-finishing	15	106.9
Truck (haulage)	1,570	12.1
Truck (utility)-personnel carrier	604	18.3
Welding machine-lathe	443	21.0
None	5,837	5.3
Not elsewhere classified	145	28.9
Unspecified	333	28.4
All groupings	31,078	2.9

[1]Excluding job title category of office workers.
[2]See appendix B for detailed explanation of equipment operated grouping.

NOTE —Owing to independent rounding, data may not add to totals shown.

Table E-44.—Nonmetallic mining 1986 workforce estimates: number of workers and coefficient of variation, by work location

Work location	Workers	CV, pct
Underground mine	3,643	5.5
Surface at underground mine	1,783	6.3
Surface mine	11,208	3.1
Plant or mill	13,634	5.6
Office	3,167	6.5
All groupings	33,434	2.9

NOTE —Owing to independent rounding, data may not add to totals shown.

Table E-45.—Nonmetallic mining 1986 workforce estimates:[1] number of workers and coefficient of variation, by experience at job, company, and mining

Experience, yr	Workers	CV, pct
At present job:		
0< to ≤1	4,900	9.0
1< to ≤2	3,681	8.8
2< to ≤3	2,142	11.2
3< to ≤5	3,711	5.4
5< to ≤10	8,197	5.8
10< to ≤20	5,253	7.8
20<	841	12.8
Unspecified	2,353	17.1
All groupings	31,078	2.9
At present company:		
0< to ≤1	2,375	10.0
1< to ≤5	6,604	5.5
5< to ≤10	8,691	7.2
10< to ≤15	6,108	4.5
15< to ≤20	2,972	7.4
20< to ≤25	1,992	9.3
25< to ≤30	914	7.4
30<	1,387	9.2
Unspecified	35	54.3
All groupings	31,078	2.9
Total mining:		
0< to ≤1	1,426	11.7
1< to ≤5	4,684	7.3
5< to ≤10	7,505	9.1
10< to ≤15	5,713	6.4
15< to ≤20	2,945	7.3
20< to ≤25	1,723	10.1
25< to ≤30	884	11.8
30<	1,424	10.3
Unspecified	4,774	9.5
All groupings	31,078	2.9

[1]Excluding job title category of office workers.

NOTE —Owing to independent rounding, data may not add to totals shown.

Table E-46.—Nonmetallic mining 1986 workforce estimates:[1] number of workers and coefficient of variation, by training received

Job training for last 2 yr, h	Workers	CV, pct
0	2,178	25.5
1-8	1,363	20.1
9-15	381	21.6
16	7,132	5.3
17-40	5,685	9.8
41-80	3,609	7.7
81-160	1,265	13.0
161+	931	20.1
Unspecified	8,532	7.2
All groupings	31,078	2.9

[1]Excluding job title category of office workers.

NOTE —Owing to independent rounding, data may not add to totals shown.

Table E-47.—Nonmetallic mining 1986 workforce estimates:[1] number of workers and coefficient of variation, by age

Age, yr	Workers	CV, pct
15-20	353	28.2
21-23	1,162	13.0
24-26	2,400	6.7
27-29	3,137	12.7
30-34	5,424	5.5
35-39	4,881	7.0
40-49	6,926	5.3
50+	6,632	2.2
Unspecified	162	40.5
All groupings	31,078	2.9

[1]Excluding job title category of office workers.

NOTE —Owing to independent rounding, data may not add to totals shown.

Table E-48.—Nonmetallic mining 1986 workforce estimates:[1] number of workers and coefficient of variation, by sex, race, and education

	Workers	CV, pct
Sex:		
Male	29,873	2.7
Female	1,061	18.9
Unspecified	143	48.3
All groupings	31,078	2.9
Race:		
White	23,327	3.7
Black	4,758	6.8
Hispanic	2,439	7.6
Other	399	11.8
Unspecified	154	38.1
All groupings	31,078	2.9
Education level:		
Some elementary	2,168	9.4
Some high school	5,155	8.0
High school diploma	14,652	3.8
Vocational diploma	2,563	14.2
Some college	2,497	12.9
College degree	1,596	11.3
Unspecified	2,445	15.7
All groupings	31,078	2.9

[1]Excluding job title category of office workers.

NOTE —Owing to independent rounding, data may not add to totals shown.

APPENDIX F.—MINING INDUSTRY POPULATION SURVEY LETTERS AND QUESTIONNAIRE

United States Department of the Interior

BUREAU OF MINES
2401 E STREET, NW.
WASHINGTON, D.C. 20241

Dear Mine Manager:

The Bureau of Mines, U.S. Department of the Interior, is requesting your help in conducting a survey of the mining industry. The survey is designed to characterize the nation's mine-worker population by occupation, job experience, training, age, and other factors. These data are necessary to accurately analyze the nation's mine accidents. At this time, the information sought by this survey cannot be obtained from any other source.

Your firm was randomly selected to represent firms of a similar size in your industry. Although your response to this survey is voluntary, the validity of the results depends upon a very high response rate. We urge you, therefore, to respond as completely and accurately as possible based upon information from your personnel files, management records, or direct response from individual workers at your mine.

Under no circumstances will the information you provide be identified by individual mine, company, or worker. The data will be used for statistical purposes only and the results of the survey when analyzed with accident statistics will be made available to the public in the form of official publications.

Instructions for completing the survey questionnaire are on the enclosed survey form. Questions regarding the survey should be directed to:

Ms. Shail Butani
Bureau of Mines
5629 Minnehaha Avenue South
Minneapolis, MN 55417
Telephone: (612) 725-4500

(Note: Collect calls regarding this survey will be accepted during regular business hours, 8:00 a.m. to 4:00 p.m., Central Time.)

Thank you for your time and effort.

Sincerely,

Robert C. Horton

Director

Enclosure

United States Department of the Interior

BUREAU OF MINES
2401 E STREET, NW.
WASHINGTON, D.C. 20241

Dear Employer:

Recently, we wrote to you requesting your help in obtaining data for a survey for the mining industry. This information will be used to produce the characteristics of the nation's mine-worker population in order to analyze the nation's mine accident data more accurately. We have not yet received your response and have enclosed an additional survey questionnaire in case the original was misplaced or did not reach you.

Because your firm was randomly selected to represent firms of a similar size in your industry, we are making every effort to obtain your response to ensure a true representation of those firms. Your response is strictly confidential and will be used for statistical purposes only.

If you have any questions, please refer to the instructions on the first page of the questionnaire or call collect, Ms. Shail Butani at 612-725-4500. If you prefer, you may report your information directly by telephone. A response during the next 2 weeks would be great assistance to the survey.

Thank you for your help and support in the Bureau's effort to characterize the mine-worker population.

Sincerely,

Robert C. Horton
Director

Enclosure

U.S. BUREAU OF MINES
Twin Cities Research Center
5629 Minnehaha Avenue South
Minneapolis, MN 55417
(612) 725-4500

MINING INDUSTRY

POPULATION SURVEY

INSTRUCTIONS:

1. Fill out this form as completely as possible and return it in the enclosed stamped envelope within three weeks.
2. This form is only for the operation with mine I.D. number as shown on the address label. Do not use for any other operation.
3. As an alternative to completing the forms, you are welcome to send copies of any administrative records, containing the requested information on *all* employees. However, it is very important that all the information requested on the forms be contained in the records.
4. (a) Obtain a list or lists of *all* the employees (hourly, salaried, managerial, and office workers, etc.) working in the operation with mine I.D. number shown on the label. It is important that each employee appear on one and only one list.
   (b) Sequentially number the employees starting with one list continuing until all the lists are exhausted.
   (c) Determine the total number of employees at this mine I.D. operation. Note: This number should be the same as the last number on the employees list.
   (d) Based on the total number of employees, mark the appropriate employment size box below.

Total No. of Employees		Selection Numbers
1 — 49	☐	All employees (1, 2, 3, 4, 5 . . .)
50 — 99	☐	Every other employee starting with employee No. 1 (1, 3, 5, 7, 9 . . .)
100 — 249	☐	Every 5th employee starting with employee No. 4 (4, 9, 14, 19, 24 . . .)
250 — 499	☐	Every 10th employee starting with employee No. 7 (7, 17, 27, 37, 47 . . .)
500 — 999	☐	Every 20th employee starting with employee No. 12 (12, 32, 52, 72, 92 . . .)
1,000 +	☐	Every 30th employee starting with employee No. 15 (15, 45, 75, 105, 135 . . .)

   (e) Record the information on the attached questionnaire for each worker whose number on the employee list corresponds to the selection numbers that fall in the above marked employment size category. Note: Depending on the total number of employees at this mine, it may not be necessary to complete all lines on the questionnaire.
   (f) See Example below.
5. If you should have any questions or need assistance in completing the form please contact →

MS. SHAIL BUTANI
U.S. Bureau of Mines
Twin Cities Research Center
5629 Minnehaha Avenue South
Minneapolis, MN 55417
CALL COLLECT (612) 725-4500

6. Company representative to be contacted regarding this report:

Name _____ Title _____ Phone ( ) _____

EXAMPLE:

Suppose there are 153 hourly employees, 31 salaried employees, and 9 office employees at Mine Operation XYZ.

Procedure:
1. Number the workers on one list first, say office (1-9).
2. Continuously number the workers on the 2nd list, say salaried (10-40).
3. Continuously number the workers on the next list, hourly (41-193).
4. Total number of employees at Mine ID XYZ is 193. Hence, check the box inside 100-249 employees.
5. Record information for employees whose numbers are 4, 9, 14, 19, 24, 29, 34 . . . 179, 184, 189.
   Note: In this case, a total of 38 employees are in the sample.

O.M.B. No. 1219-0098
Approval Exp. 9/30/1986

U.S. BUREAU OF MINES
Twin Cities Research Center
5629 Minnehaha Avenue South
Minneapolis, MN 55417
(612) 725-4500

MINING INDUSTRY
POPULATION SURVEY

EMPLOYEE DATA:

Sample No.	Job title or occupation	Principal equipment operated (if any)	Principal operation subunit code[1]	Experience: This job	Experience: This co.	Experience: Total mine	Job-related training during last 2 years	Age	Sex	Race[2]	Education[3]
			U SU S P O	yrs/mo	yrs/mos	yrs/mos	wks/hrs	yrs.	M F	W B H O U	E SH HD V SC CD
EXAMPLE	truck driver	truck	☐☐☒☐☐	5/3	7/0	8/6	4/10	29	☒ ☐	☐☐☐☒☐	☐☒☐☐☐☐
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[1] U — underground; SU - surface operations at underground mines; S - surface; P - preparation plant or mill; O - office worker
[2] W — white; B — black; H — hispanic; O — other; U — unknown
[3] E — 1 through 8th grade; SH — some high school; HD — high school diploma; V — vocational; SC — some college; CD — college degree

U.S. BUREAU OF MINES
Twin Cities Research Center
5629 Minnehaha Avenue South
Minneapolis, MN 55417
(612) 725-4500

MINING INDUSTRY
POPULATION SURVEY

EMPLOYEE DATA:

Sample No.	Job title or occupation	Principal equipment operated (if any)	Principal operation subunit code[1]	Experience: This job	Experience: This co.	Experience: Total mine	Job-related training during last 2 years	Age	Sex	Race[2]	Education[3]
			U SU S P O	yrs/mo	yrs/mos	yrs/mos	wks/hrs	yrs.	M F	W B H O U	E SH HD V SC CD
EXAMPLE	truck driver	truck	☐☐☒☐☐	5/3	7/0	8/6	4/10	29	☒ ☐	☐☐☐☒☐	☐☒☐☐☐☐
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MINING INDUSTRY
POPULATION SURVEY

EMPLOYEE DATA:

Sample No.	Job title or occupation	Principal equipment operated (if any)	Principal operation subunit code[1] U SU S P O	Experience: This job yrs/mo	Experience: This co. yrs/mos	Experience: Total mine yrs/mos	Job-related training during last 2 years wks/hrs	Age yrs.	Sex M F	Race[2] W B H O U	Education[3] E SH HD V SC CD
EXAMPLE	truck driver	truck	☐☐☒☐☐	5/3	7/0	8/6	4/10	29	☒ ☐	☐☐☐☒☐	☐☒☐☐☐☐
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* U.S. GOVERNMENT PRINTING OFFICE: 611-012/00,028
INT.-BU.OF MINES, PGH.,PA. 28844
☆ U.S. GOVERNMENT PRINTING OFFICE: 1986 - 654-601

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